MICROVITEC PLC

SERVICE MANUAL

SERIES – 3
COLOUR DISPLAY MONITORS

INTRODUCTION

SERIES 3 MONITORS

The contents of this manual are divided into several sections, and deal with Monitors in the SERIES 3 product range.

As described following, we take a look in some detail at the various sections in the Manual and explain how they are to be used to their best advantage. The Manual is intended to support the servicing of SERIES 3 Monitors.

SPECIFICATIONS

The first specification list (Models 1431/1432) contains a full specification and is generally typical of SERIES 3 Monitors; subsequent lists contain only the areas that differ from the first list. For example; the mains supply is 180-265 volts, ~ 48-64 Hz (excluding 110 volt models). This will only be given on the first specification list. Therefore, unless otherwise stated, refer to specification 1 (Models 1431/1432) for other similar specified parameters.

FACTORY PRE-SET ADJUSTMENTS

Some of these adjustments are very critical, not only from an operational point but also from a safety point. The manufacturer recommends that you read and understand the section fully before making any adjustments.

All pre-set adjustments are included in this section. You are given the prefix for example: Field Linearity VR312. If you are not sure of the location of any pre-set (or component) then you should refer to the section containing PCB or CRT base panel layouts. Once you have located the pre-set, you are then told what effect the adjustment will have on the display.

REMOVAL/INSTALLATION (MECHANICAL DETAIL)

This section gives information (with text and illustrations) on how to remove and replace major service items such as: CRT, Main PCB and Tripler etc.

DESCRIPTION AND OPERATION

These sections will help you to understand the design concept of the Microvitec SERIES 3 Monitor. They provide detailed descriptions of each part of the circuit. For example; Line Timebase, Field Timebase etc. It is important that you read these sections for a full understanding of the monitor's working and of the fault isolation and repair procedures listed.

CIRCUIT DIAGRAM AND PARTS LISTING

There are many Model variants in the Microvitec SERIES 3 range. Obviously it would not be practical to supply all the circuit diagram variants. Therefore one circuit diagram is provided for the drive/deflection main PCB assembly and including the Tube Base assembly which is typical of SERIES 3 production. Two Parts Lists are provided; the first covers the 1431/MS4 model and the second covers earlier models and variants, for which circuit diagrams are included at the end of the list. These circuit diagrams are for earlier models with either a standard/medium resolution tube base or a high resolution tube base. Both lists should be employed in conjunction with the appropriate circuit diagram for confirmation of component values, types, rating, etc. on individual models.

Component location is a problem that you may encounter. To assist you in this matter we have included full PCB layouts. These PCB layouts should be used in conjunction with the circuit diagrams and accompanying waveform diagrams provided for full service information.

FAULT ISOLATION AND REPAIR PROCEDURE

Configured in a boxed flow chart format. Each fault is accompanied by a series of boxes which will ask you to check a particular part of the equipment. After you have carried out the check a question is asked (refer to Fig. 1).

INTERMITTENT -
LINE SYNC

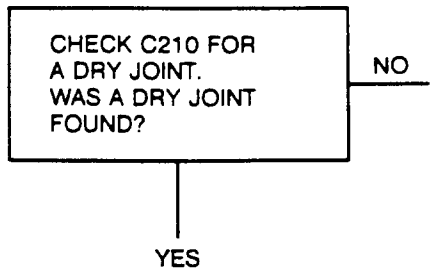


FIG. 1

From the result of the question you can then answer YES or NO.

If the answer is NO (as in this case) you must move onto the next box and carry out the next check.

If the answer is YES, the next box will be (refer to Fig. 2).

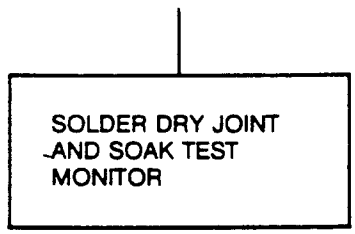


FIG. 2

Further into the Fault Isolation Procedure you may be asked to check a component: for example (refer to Fig. 3).

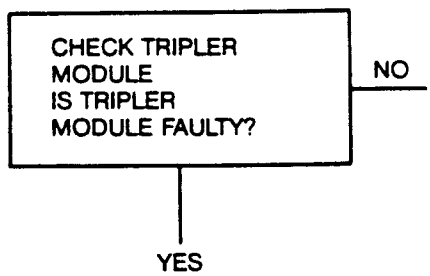


FIG. 3

In this case the best method of checking the Tripler Module would be substitution for a serviceable Tripler Module. This would establish very quickly the condition of the Tripler Module in relation to the fault.

When all the known fault causes have been effected, the chart will be terminated by a box reading: (refer to Fig. 4).

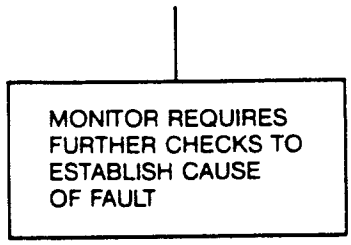


FIG. 4

If you have reached this stage you should use the circuit diagram and items of test equipment and adopt a logical method of fault isolation and repair.

ILLUSTRATED PARTS LISTING (IPL)

This section contains all current cabinet designs in the Microvitec 'CUB' monitor range. It is intended to show the service technician how to gain access to the equipment for repair purposes. In addition component part numbers accompany each illustration; this will assist you when ordering a component part.

TECHNICAL SPECIFICATIONS

MODELS - 1431/1432

SYSTEM

1 ; 625 lines, 50 fields interlaced
or 312/313 lines, 50 fields non interlaced
2 ; 525 lines, 60 fields interlaced
or 262/263 lines, 60 fields non-interlaced

other non-standard systems may be suitable
consult MICROVITEC PLC.

MAINS SUPPLY

Nominal 180 - 265V, ~ 40 to 64Hz

TIMEBASE (LINE)

Pull-in range 15 to 16KHz

FRAME FREQUENCY

50Hz - Pull-in range 45 to 65Hz

POSITIONAL ERROR

± 3%

CONVERGENCE ERROR

0.6mm screen centre
1.6mm screen edge

EHT

24KV approximately

EHT REGULATION

± 1KV

LINE FREQUENCY

15.625KHz

DEGAUSSING

Automatic at switch ON

BANDWIDTH

18MHz

RESOLUTION

452(H)x585(V) elements

DOT PITCH

0.64mm

CRT

Rectangular 335.4mm (screen diagonal) 90 deg deflection.
Precision in-line gun vertical stripe screen, high voltage focus

SIGNAL INPUTS - MODEL 1431

TTL compatible; 1500 ohm R, G, B inputs link selectable, positive or negative video

SIGNAL INPUTS - MODEL 1432

Linear; 0 to 4V 1500 ohm R, G, B, inputs.
Positive video, composite or separate line and field synchronisation - each link selectable positive or negative

TECHNICAL SPECIFICATIONS

SIGNAL INPUT CONNECTOR

10 pin in-line 'SYSTEM 25' Pressac

OPERATING TEMP

0 to 55 deg C (max) open chassis
−10 deg C to +40 deg C (max)

POWER CONSUMPTION

65 Watts approximately

MODELS 1441 AND 1442 14" (HIGH RESOLUTION)

GENERAL NOTE

As Models 1431 and 1432, but with the following exceptions:

CONVERGENCE ERROR (MAX)

0.3mm screen centre
0.8mm screen edge

EHT

Approximately 24KV

BANDWIDTH

18MHz

RESOLUTION

895(H)x585(V) elements, rectangular 333mm (screen diagonal)
Automatic degaussing at switch on. High focus voltage in-line gun.
90 deg. diagonal deflection, 0.31mm dot pitch black matrix screen with pigmented phosphors.

DOT PITCH

0.31mm

POSITIONAL ERROR

± 2%

CONVERGENCE ERROR

0.8mm screen edge

MODEL 1451

GENERAL NOTE

As Models 1431 and 1432, but with the following exceptions:

RESOLUTION

652(H)x585(V) elements

DOT PITCH

0.43mm

CONVERGENCE ERROR

1.2mm screen edge

NOTE

A conversion kit is available which enables all the models listed above to be connected to a 110V supply. The kit is listed item by item in the Switched Mode Power Supply Section.

MODEL 2030

GENERAL NOTE

As Models 1431 and 1432, but with the following exceptions:

CONVERGENCE ERROR (MAX)

0.4mm screen centre
1.8mm screen edge

RESOLUTION

505(H)x585(V) elements, 80 characters on 6 dot, wide matrix

DOT PITCH

0.8mm

CRT

Rectangular 480mm (screen diagonal) 90 deg deflection precision in-line gun vertical stripe screen, high voltage focus

POWER CONSUMPTION

80 Watts approximately

MODEL 2040

GENERAL NOTE

As Models 1431 and 1432, but with the following exceptions:

RESOLUTION

940(H)x705(V) elements

DOT PITCH

0.47mm

POSITIONAL ERROR

± 4%

POWER CONSUMPTION

80 Watts approximately

CONVERGENCE ERROR

1.0mm screen edge

SAFETY STANDARDS

SAFETY AND ISOLATION

UNDER NO CIRCUMSTANCES SHOULD ANY FORM OF REPAIR OR MAINTENANCE BE ATTEMPTED BY ANY PERSON OTHER THAN A QUALIFIED ENGINEER.

SWITCHED MODE POWER SUPPLY

Although the outputs from the power supply are isolated from the incoming mains supply, the bridge rectifier and the control and regulation circuit **ARE NOT** isolated. Therefore, when servicing the power supply section of the chassis assembly, the SMPSU should be supplied by a MAINS ISOLATION TRANSFORMER OF AT LEAST 300VA RATING.

HANDLING PRECAUTIONS

HT ELECTRICAL CHARGES

The power supply section remains charged with respect to chassis for 30-60 seconds after switching off. Care should be taken when handling the chassis to avoid touching this area during this time.

EHT CHARGES - HORIZONTAL (LINE) OUTPUT STAGE/CRT

Before handling or attempting adjustment or replacement on the horizontal (line) output stage or on CRT areas - always discharge the final anode of the CRT - by using a suitable EHT probe only. Do this by connecting **first** to CRT dag earth coating/earth braid assembly, and then to

[redacted]

PLEASE NOTE

Very considerable electrical charges can be stored in these areas - even for lengthy periods of time after 'switch off'.

In the interests of your personal safety observe the precautions listed.

SAFETY CRITICAL COMPONENTS

Components marked ⚠ on the parts list and circuit diagram are safety approved types and they should be replaced **only** with components supplied or approved by our Service Department. It is also recommended that the components not marked with the safety symbol should be replaced by parts of the type originally fitted, and this applies particularly to those resistors which are stood off the printed circuit boards.

HANDLING PRECAUTIONS - STATIC ELECTRICAL CHARGES

Depending on equipment type and model, the equipment may contain devices which may be damaged by static electrical charges during handling. Generally, these devices are indicated by a ⚠ symbol.

When replacing or handling these devices or PCBs containing such devices, care should be taken. Soldering irons should be earthed and personnel should use wrist straps earthed via a 1 Mohm resistor. If the latter is not practicable they should discharge themselves of any static electricity by touching an earthed point.

Static sensitive devices should be packed in suitable conductive containers.

SAFETY STANDARDS

OPERATING SAFETY

We recommend - after effecting any Service and/or replacement of any part of the monitor, or after any repair work - that the SAFETY CHECKS listed following are carried out.

NOTE

Ensure on re-assembly that ALL earth connections are replaced SECURELY; in particular safety earths and the 'P' band and dag earth 'CRT' earth connections.

IMPORTANT!

Failure to observe the points noted could affect your own safety, the product's safety and ultimately, that of the user.

SAFETY CHECKS

EARTH CONTINUITY CHECK

a) Using a suitable multimeter:

Check between 'Dag' earth on the CRT and mains plug earth pin, (safety earth connection). The reading should be less than 470Kohm (with tube discharged).

b) Check mains earth continuity between mains plug earth pin and:

1. CRT 'P' Band.
2. PCB 'Earth' pin on main chassis.

c) The final assembly/housing should be checked for continuity between the mains plug earth pin ⏚, and ALL exposed metalwork.

NOTE

Tests b) and c) should have a resistance of less than 0.5 ohm.

HIGH VOLTAGE ISOLATION/INSULATION CHECKS

a) On the mains supply 3-pin plug - check between 'live' and 'neutral' to 'earth' ⏚ for leakage and breakdown.

This test should be made with 1.5KV to 1.6KV AC or DC equivalent.

ON TEST

1. No breakdown should occur.
2. Earth leakage should be less than 6mA at 1.5KV.

b) Insulation resistance should be greater than 2 Megohms at 500V DC.

CAUTION

A MONITOR FAILING ANY OF THE ABOVE CHECKS MUST BE RESTORED TO SAFE WORKING CONDITION BEFORE BEING RETURNED TO THE USER.

ELECTRICAL SUPPLY

WARNING

THIS APPARATUS MUST BE EARTHED.

IMPORTANT

The wires in the mains lead are coloured in accordance with the following code:

GREEN AND YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

As the colours of the wires in the mains lead may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

Earth

The wire coloured GREEN and YELLOW must be connected to the terminal marked 'E' or by the safety earth symbol or coloured GREEN, or GREEN and YELLOW.

Neutral

The wire coloured BLUE must be connected to the terminal marked 'N', or coloured BLACK.

Live

The wire coloured BROWN must be connected to the terminal marked 'L', or coloured RED.

X-RAY RADIATION

X-rays constitute a health hazard on prolonged exposure at close range unless adequate shielding is provided.

Precautions must be exercised during servicing of display equipment to ensure that the anode voltage and other tube voltages are adjusted to the recommended values.

Replace with a tube of the same type number or recommended replacement to assure continued safety.

IMPLOSION PROTECTION

This tube employs integral implosion protection and must be replaced with a tube of the same type or a recommended replacement to assure continued safety.

SHOCK HAZARD

The high voltage at which the tube is operated may be very dangerous. Extreme care should be taken in the servicing or adjustment of any high voltage circuit. Caution must be exercised during the replacement or servicing of the tube since a residual electrical charge may be contained on the high voltage capacitor formed by the external and internal conductive coating of the tube funnel. To remove any undesirable residual high voltage charges from the tube, "bleed off" the charge by shorting the anode contact button, located in the funnel of the tube, to the external conductive coating before handling the tube.

TUBE HANDLING

Wear heavy protective clothing, including gloves and safety goggles with side shields. Handle the tube with extreme care. Do not strike, scratch or subject the tube to more than moderate pressure. Particular care should be taken to prevent damage to the seal area.

INPUT CONNECTIONS AND CUSTOMER CONTROLS

T.T.L. COMPATIBLE/LINEAR INPUT SELECTION

T.T.L. compatible or linear (0 to 4V, 1500 ohm) input level options can be selected by moving 3 links:

TL103 R,G,B located on main PCB:
position 1 corresponds with linear levels
position 2 with T.T.L. levels

NOTE

Contrast control VR111, inoperative when position 1 is selected.

SYNCHRONISATION - INPUT OPTIONS

Sync inputs must be T.T.L. compatible, the timing of sync pulses should approximately correspond with those used for broadcast purposes (refer to Fig. 1 for available options.)

INVERSE VIDEO

To facilitate inversion of T.T.L. compatible video input signals by either moving link TL101 on main PCB to position 1, or removing TL101 and feeding a positive T.T.L. level in to pin 9 of PL101.

NOTE

Monitors are normally despatched wired in composite negative (going) syncs mode, with TL102 not fitted, and TL106 selected to position 1.

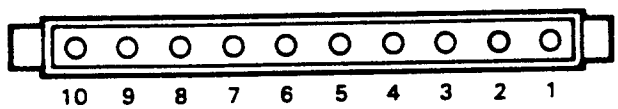


FIG. 1 SIGNAL INPUT PIN CONNECTIONS

KEY
1 = +12V
2 = No connection
3 = Sync 3; +field sync
4 = Red video
5 = Sync 2; -field sync
6 = Green video
7 = Sync 1; composite sync or line sync
8 = Blue video
9 = Normal/inverse T.T.L. video
10 = Ground

SYNCHRONISATION OPTIONS

SYNC OPTIONS	INPUTS (PL101)	LINK POSITION
MIXED		
−ve going	pin 7	TL102 not fitted TL106 in position 1
+ve going	pin 7	TL102 fitted TL106 in position 1
SEPARATE		
−ve line	pin 7	TL102 not fitted
−ve field	pin 5	TL106 in position 1
+ve line	pin 7	TL102 fitted
+ve field	pin 3	TL106 in position 2
−ve line	pin 7	TL102 not fitted
+ve field	pin 3	TL106 in position 1

INPUT CONNECTIONS AND CUSTOMER CONTROLS

CUSTOMER CONTROLS

NOTE

On 'D' series monitors the controls listed below are located on the front of the monitor, concealed behind a downward hinging door.

ON/OFF Switch

Mounted rear of the monitor, allows mains to be switched on and off without switching the mains supply off.

Contrast/Brilliance Adjustment (VR111)

Mounted rear of main PCB, only active in T.T.L. mode, and allows video gain to be varied from maximum to minimum, at black level.

Brightness Adjustment (VR134 when fitted)

Mounted rear of main PCB, next to VR111. Active in all modes of operation allowing brightness of display to be varied above or below cut off.

Volume/Audio Adjustment (when fitted)

Mounted rear of the monitor, allows user to adjust volume/audio level of the monitor. Clockwise to increase, anti-clockwise to decrease.

Colour Saturation Control (when fitted)

Mounted rear of the monitor, allows user to adjust the colour level of the monitor. Clockwise to increase, anti-clockwise to decrease.

PRESET CONTROLS/ADJUSTMENTS

GENERAL

Preset controls are initially set up at the factory and normally do not require adjustment unless a change is required in the input configuration - for example, typically to install a different graphics adaptor card in the associated host system. Details of the preset controls with their use and adjustment is described following:

PRESET ADJUSTMENTS

TO PROTECT AGAINST ELECTRICAL SHOCK HAZARD AND TO PROTECT THE MONITOR AGAINST SHORT CIRCUIT AND DAMAGE - USE ONLY AN INSULATED NON-METALLIC TRIMMING TOOL TO MAKE ADJUSTMENTS TO THE PRESET CONTROLS.

Care should be taken when adjusting presets. Adjust only one at a time and note carefully the effects of the adjustment before proceeding on the other adjustments. In some cases, it may be advisable to take note of the original setting position of the preset BEFORE adjustment in case the need arises to return to the original setting.

INTERCONNECTION COMPATIBILITY

On installation and prior to preset adjustments, ensure that video and sync connections from the host system are compatible with:

a) The monitor.

b) The interconnecting lead assembly in use.

Having determined these points are correct proceed with the adjustments required according to the details given in the accompanying table and description following.

PRESET CONTROL SETTING

1. To set the preset controls, use a signal generating a display occupying as large a screen area as possible. For example a full page of upper case letter 'H' would be suitable, or alternatively a suitable test card as appropriate.

2. Preset controls in the table following marked with an asterisk * may be adjusted if required.

   However, normally this should not be necessary, as these presets are set accurately at the factory during manufacture.

   NOTE

   A circle is employed in the screen displays illustrated following, only to demonstrate more clearly the geometric effects of wrong settings.

PRESET LOCATIONS

The physical locations of most of the preset controls referred to in the descriptions following are shown in the illustration contained in the Section preceding.

Notable exceptions are preset controls contained on the TUBE BASE PCB assembly.

The positions of these presets are indicated on the individual PCB's by appropriate ident markings.

PRESET CONTROLS/ADJUSTMENTS

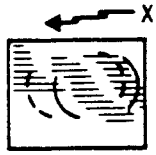
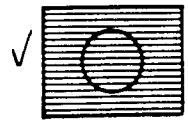
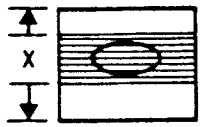
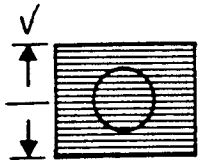
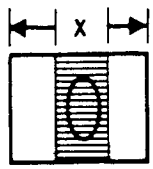
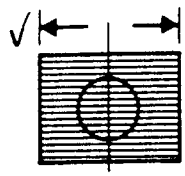
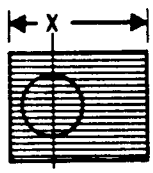
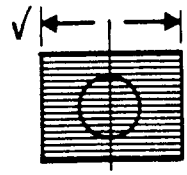
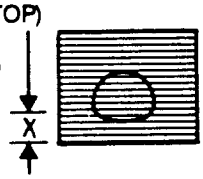
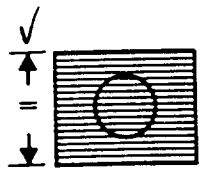
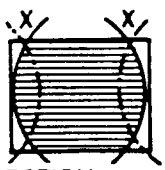
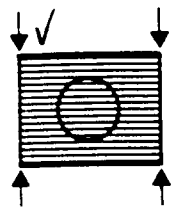
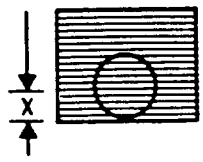
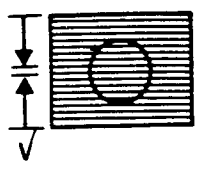
PRESET	WRONG X	RIGHT √
LINE FREQUENCY	PICTURE BREAKS UP ADJUST L.FREQ. 	 PICTURE LOCKED
FIELD FREQUENCY	PICTURE ROLLS ADJUST F.FREQ. 	 PICTURE LOCKED
HEIGHT	ADJUST HEIGHT 	 HEIGHT SET
WIDTH	ADJUST WIDTH 	 WIDTH SET
LINE PHASE*	PICTURE NOT CENTRAL ADJUST L. PHASE 	 PICTURE CENTRAL PHASE SET
FIELD LINEARITY* (VERTICAL LINEARITY)	BOTTOM (OR TOP) OF PICTURE COMPRESSED ADJUST F.LIN 	 VERTICAL SCAN LINEAR LIN.SET
EAST/WEST* CORRECTION	PICTURE 'BARREL SHAPED' OR 'PIN-CUSHION' SHAPED — ADJUST E/W CORRECTION 	 VERTICAL EDGES STRAIGHT E/W SET
FIELD SHIFT	PICTURE NOT CENTRAL ADJUST FIELD SHIFT 	 PICTURE CENTRAL FIELD SHIFT SET

TABLE OF PRESET ADJUSTMENTS

PRESET CONTROLS/ADJUSTMENTS

FACTORY PRESET ADJUSTMENTS

NOTE

Certain preset adjustments can be from above or below the main panel. Adjustments are best made on a static display, preferably a Microvitec suitable test card or test pattern.

SET HT - VR1

Adjusted accurately at the factory to give 142V with a dark picture on screen, and should not be readjusted.

WARNING

THIS IS A CRITICAL SAFETY ADJUSTMENT. FAILURE TO COMPLY WITH THE ABOVE WILL INVALIDATE THE WARRANTY.

LINE FREQUENCY VR218

1. Set the free running oscillator frequency to almost frequency of incoming line syncs.
2. Adjust VR218, feed monitor with R.G.B. video and interrupt the mixed sync information to the line oscillator by removing sync information on PL101, (sync 1, 2 or 3 etc).
3. Adjust VR218, until the picture almost stabilizes then re-connect via PL101 as required. Resulting in a stable picture lock.

FIELD FREQUENCY VR307

Control of the free running field oscillator frequency by adjusting VR307, gives a stable picture lock. For effective lock VR307 should be set to 56Hz.

LINE PHASE VR220

VR220, controls positioning of video information relative to raster in line scan direction.

Ensure the following operations have been effected:

1. The line frequency has been set (VR218).
2. The picture width has been set (L202).
3. The monitor is positioned in its place of use.

NOTE

1. VR220 when adjusted will shift the picture, right or left.
2. VR220 only adjusts the picture relative to the raster position. Prior to adjustment, ensure that the sides of the picture are not folding over.

WIDTH L202

CAUTION

CARE SHOULD BE TAKEN WHEN ADJUSTING THIS COMPONENT DUE TO ITS PROXIMITY TO EHT SECTION, IN PARTICULAR, THE TRIPLER AND LINE OUTPUT TRANSFORMER.

Using a non-metallic trimming tool adjust L202, to effect picture width adjustment.

Normally factory set for maximum width.

NOTE

L202 core may not always be fitted.

HEIGHT VR306

VR306, when adjusted will provide for raster under scan and overscan.

PRESET CONTROLS/ADJUSTMENTS

FIELD LINEARITY VR312

Adjust VR312, to give a linear picture in vertical direction.

NOTE

Best results are obtained by using a cross hatch type grid or MICROVITEC test generator.

FIELD SHIFT VR312

VR321, controls positioning of raster in field scan direction.

EAST-WEST CORRECTION VR328

NOTE

Some models will not require this adjustment, because east-west correction is integral on certain types of CRT.

Adjustment of VR328 will achieve straight verticals on left and right hand sides of pictures.

FOCUS

Located on end of tripler module, set brightness control to normal viewing level, then make focus adjustment.

ADJUST COLOUR BACKGROUND CONTROLS (BLACK LEVEL)

NOTE

These controls are factory preset. If adjustment is necessary, an AVO 8 multimeter and/or oscilloscope will be required. However, best results are obtained by using an oscilloscope.

Prepare to adjust colour background controls

1. Set customer contrast (VR111), brightness (VR314) and A1 (VR932) full anti-clockwise.
2. Disconnect R.G.B. sync inputs

Adust red, green and blue

1. Adjust VR906 for red cathode (black level) volts
2. Adjust VR914 for green cathode (black level) volts
3. Adjust VR921 for blue cathode (black level) volts
4. The above voltages are:
   a) 150V-14" monitor (TTL or Linear)
   b) 155V-20" monitor (TTL or Linear)
   c) 140V-12"/14" high res monitor (TTL or Linear)

Adjust A1 voltage

1. Adjust VR932 until a raster is just visible.
2. Raster colour may be neutral. However, it is very likely shaded towards red, green, blue or a combination of any two colours.
3. Establish raster colour shading as follows:
   a) Red and Green - Yellow
   b) Red and Blue - Magenta
   c) Blue and Green - Cyan

4. Reduce black level of remaining one or two guns using VR906, VR914, VR921 or combination until a neutral raster is achieved.

5. Re-adjust VR932 to just extinguish raster.

6. Input - R,G,B and sync signals, then adjust VR111 clockwise.

7. If correct while balance has not been achieved, repeat operations 1 through to 6.

ADJUST COLOUR GAIN CONTROLS

CAUTION

MAKE THE FOLLOWING ADJUSTMENTS USING A DC COUPLED OSCILLOSCOPE ONLY.

Prepare to adjust colour gain controls

1. Disable beam current limit circuit by removing TL901 in series with CRT heaters on tube base panel.

2. Provide a test pattern with peak white and black level information on red, green and blue.

3. Ensure VR111 is fully clockwise to provide maximum drive voltages to video output stages.

4. Above voltages are:
   a) 70V p-p on 14" monitor - TTL mode
   b) 70V p-p on 20" monitor - TTL mode
   c) 60V p-p on 14"/20" monitor - medium and high resolution

Adjust red, green and blue gain controls

1. Adjust VR903, for red peak to peak drive volts at R926.

2. Adjust VR910, for green peak to peak volts at R925.

3. Adjust VR916, for blue peak to peak volts at R924.

REMOVAL/INSTALLATION DETAILS

IMPORTANT NOTES

Refer to the notes in the Safety Standards Section contained in this Manual, before carrying out any of the operations following. The safety guidelines given in these notes apply to the repair, service, and/or replacement of parts or components - or if attempting adjustments to the monitor in any way.

WARNING

ENSURE THE MONITOR IS DISCONNECTED FROM THE MAINS ELECTRICAL SUPPLY BEFORE EFFECTING ANY OF THE OPERATIONS DETAILED FOLLOWING:

DANGER!

THE PICTURE TUBE STAYS CHARGED TO THE FULL EHT VOLTAGE.

Discharge the tube **BEFORE** attempting to remove the EHT cap (Poppy) connector. (See Safety Standards Section).

Observe the warning to delay handling the chassis for 30-60 seconds after switch off.

MAIN PCB REMOVAL/INSTALLATION (FIG 1)

1. OBSERVE NOTES UNDER 'SAFETY STANDARDS - EHT CHARGE'. Disconnect EHT lead (1) from CRT. (Refer to Fig. 1a).
   To ensure no charge remains on tripler connect the EHT lead to chassis metalwork.
2. Discharge CRT final anode by connecting it first to CRT dag coating, using a suitable EHT probe only, then to CRT final anode EHT button connector.
3. Refer to Figs 1b and 1c - Disconnect PL201 (2), PL1 (3) and mains plug PL3.
4. Refer to Fig 1d - Remove tube base panel and CRT earthing braid tag from earth braid pin on Tube Base panel, marked CRT.
5. Refer to Fig 1e - Remove 'P' band earthing tag (5) from main PCB, located next to tripler module.
6. Disconnect PL101 (7), PL102 (8), (Refer to Fig 1e) then disconnect tube base from CRT. (Refer to Fig 1d).
7. Release in turn, each of the nylon self locking PCB support clips (6), as shown in Fig 1f, lifting PCB slightly in each case.
8. The main PCB may now be removed by lifting upwards, and withdrawing from the rear together with the tube base panel, as shown in Fig 1g.
9. For installation effect the above operations in reverse order.

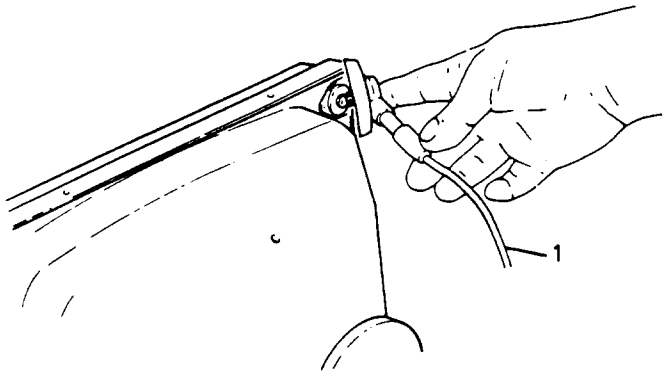


FIG. 1)a

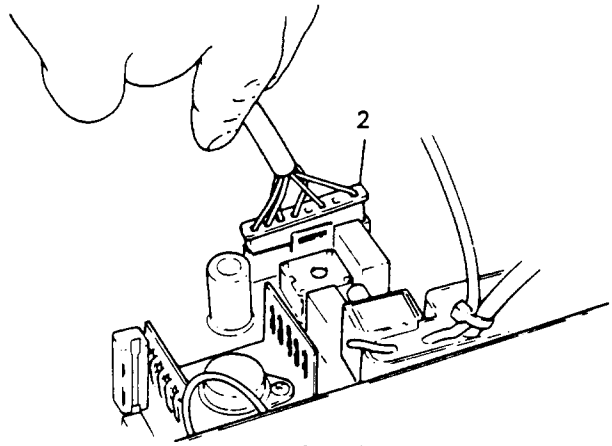


FIG. 1)b

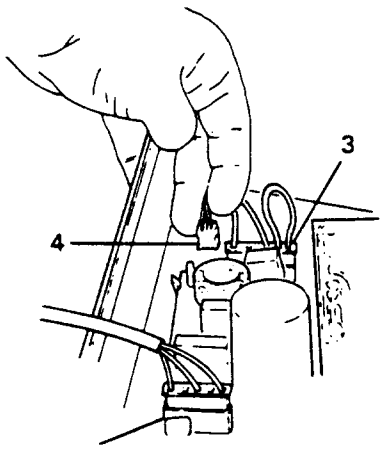


FIG. 1)c

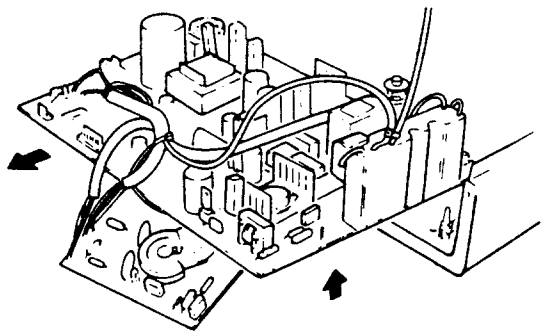


FIG. 1)d

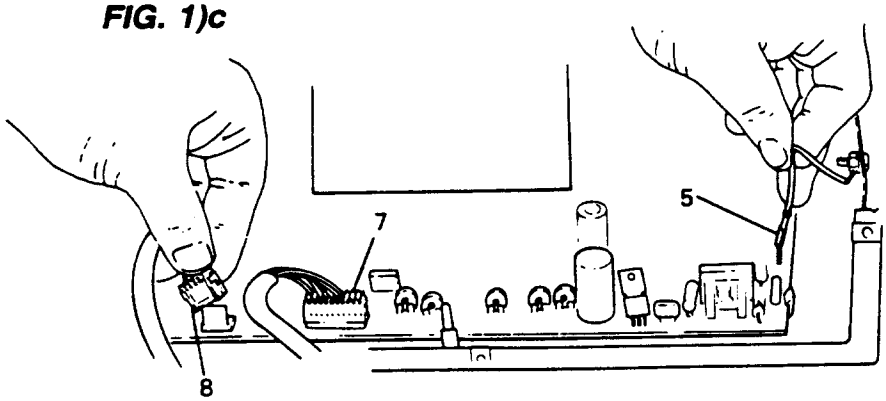


FIG. 1)e

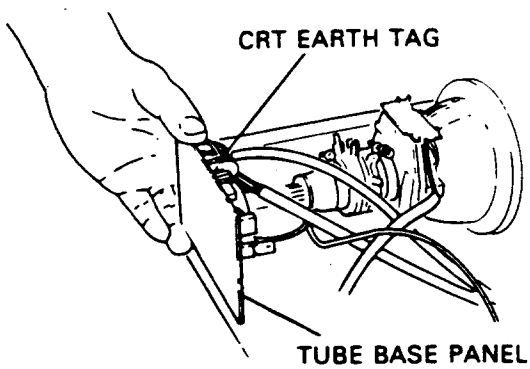


FIG. 1)f

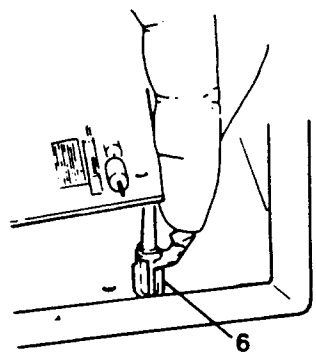


FIG. 1)g

FIG. 1 MAIN PCB REMOVAL/INSTALLATION DETAILS

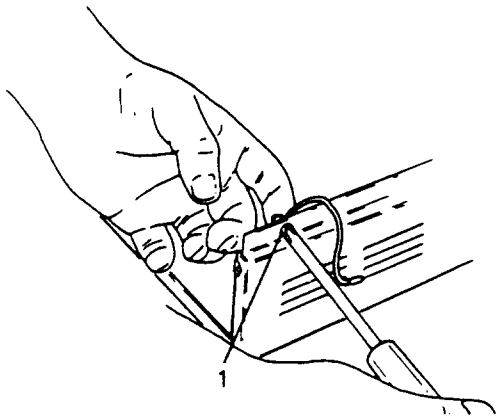


FIG. 2)a

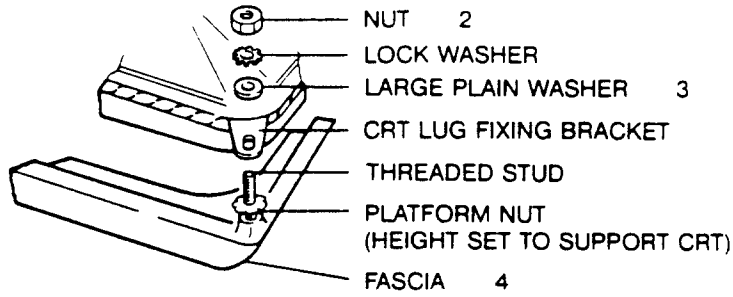


FIG. 2)b

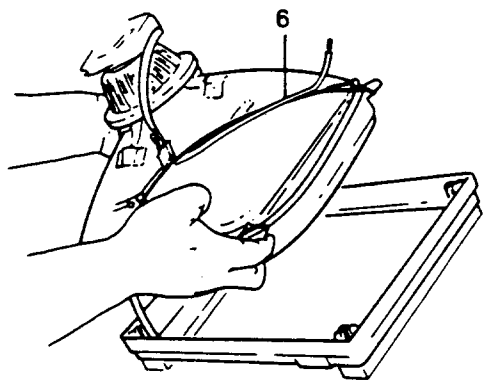


FIG. 2)c

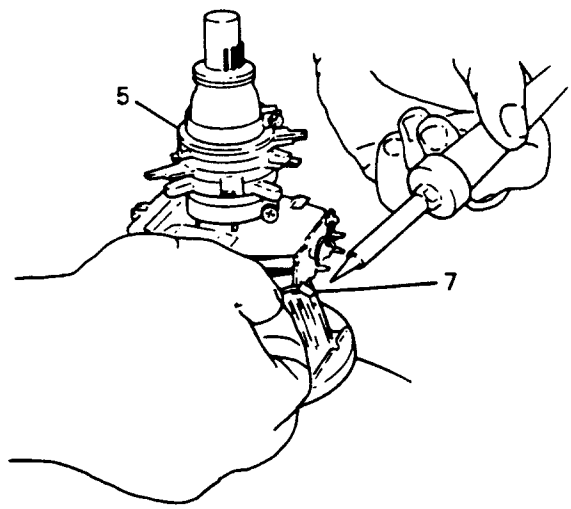


FIG. 2)d

FIG. 2 CRT REMOVAL/INSTALLATION

CRT REMOVAL/INSTALLATION (FIG. 2)

OBSERVE NOTES UNDER 'SAFETY STANDARDS - EHT CHARGES'.

1. Effect operations 1 through 8 for MAIN PCB REMOVAL/INSTALLATION, then position monitor so that the CRT is face down on two padded support blocks.
2. Remove two earthing screws (1). (See Fig. 2)a), then refer to the illustrated mechanical parts section and remove the base of the monitor.
3. Unplug as required - Interconnecting Lead Assemblies/Wiring Harness Connections, Tube Base PCB Assembly from CRT Tube Base, and EHT Connector, etc. Unplug CRT earth braid lead from dag earth braid pin on Tube Base Panel, marked CRT.
4. Detach as required the various earthing lead flexible connections.

IMPORTANT NOTE

Ensure on re-assembly that ALL earth connections are replaced SECURELY; in particular Safety Earths and the 'P' band and dag earth CRT earth connections.

5. Remove the four nuts (2) and four lockwashers and four large plain washers (3) securing CRT to cabinet fascia (4). (See Fig. 2)b).

6. Carefully withdraw CRT vertically. Be careful not to disturb the height settings of the platform nuts supporting the CRT (Fig. 2)b).

7. Transfer degauss coil (5) and earthing braid (6) in Fig. 2)a and scan coil lead assembly (7) (Fig. 2)d to new CRT. When fitting the new CRT ensure the height of platform nuts are set correctly, so that the CRT is supported by the CRT lug fixing brackets. (See Fig. 2)b).

IMPORTANT

Do not disturb the tube neck components. These have been set for optimum performance during manufacture and are an integral part of the tube system.

8. Install main PCB assembly by effecting operations 1 through 8, for MAIN PCB REMOVAL/INSTALLATION, in reverse order.

9. CRT installation safety checks:

   a) Check for correct fitting of CRT earthing braid item 6 in Fig. 2)a.

   b) Ensure black lead from CRT earth braid to tube base is connected.

   c) Check 'P' band earth has been re-connected.

LINE OUTPUT TRANSISTOR (TR202) AND SMPSU OUTPUT TRANSISTOR (TR2) - REMOVAL/INSTALLATION (FIG 3)

REMOVE TRANSISTOR

1. Remove two M3 screws (1) securing transistor and heatsink to main PCB.

2. Unsolder base and emitter connections on PCB, then withdraw transistor/heatsink (4)

3. Separate transistor from heatsink, retaining insulating bushes (3) and mica washer (2) for refitment.

INSTALL TRANSISTOR

1. Coat underside of transistor with thermally conductive heatsink compound.

2. Effect previous operations, 1. through 3., in reverse order.

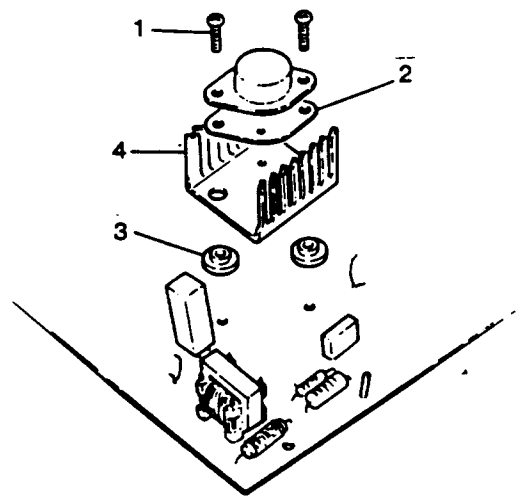


FIG. 3 LINE OUTPUT TRANSISTOR (TR202) AND SMPSU OUTPUT TRANSISTOR - REMOVAL/INSTALLATION

TRIPLER - REMOVAL/INSTALLATION (FIG. 4)

REMOVAL

1. Remove EHT lead from CRT and discharge CRT final anode to the earth braid.
2. Unsolder the following: Lead from line output transformer overwind (1) focus lead (2) to tube base panel at the tripler end.
3. Unsolder from main PCB: Earth return (3) from focus control, clamp diode earth return (4)
4. Loosen, but do not remove tripler securing screws (5), then withdraw tripler module (6) from main PCB.

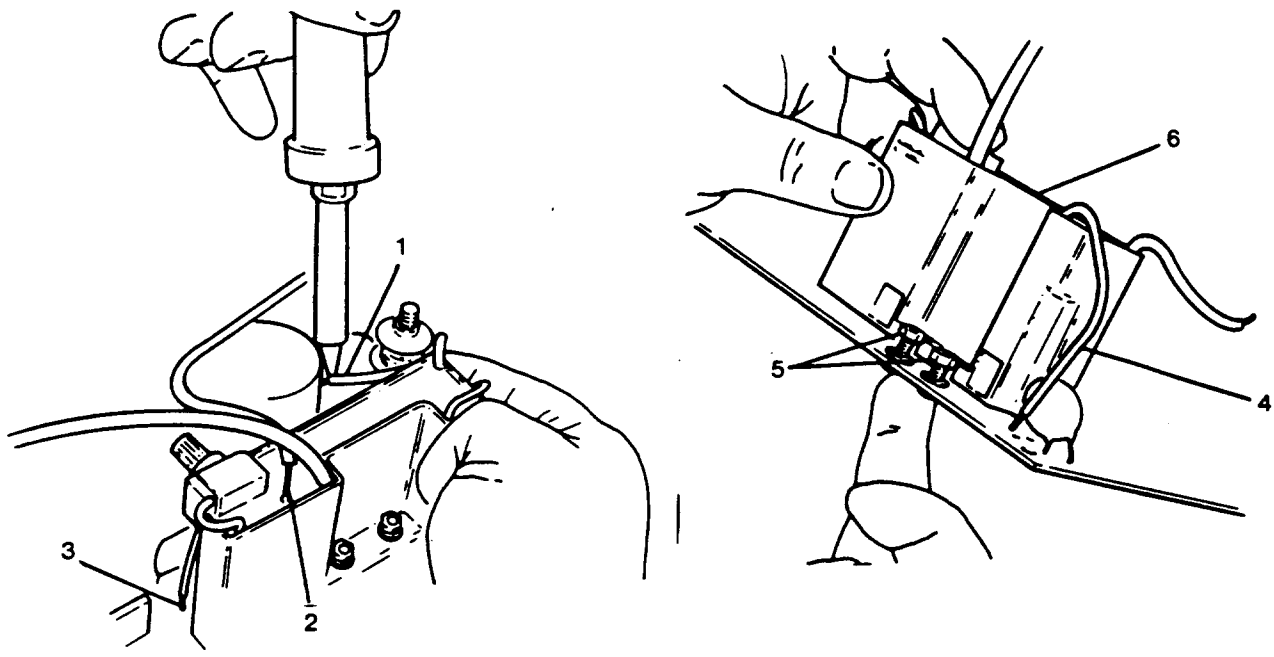
INSTALLATION

1. Position tripler module (6) on main PCB assembly and secure with screws (5).
2. Solder on main PCB: Earth return (3) from focus control, clamp diode earth return (4).
3. Solder : Lead from line output transformer overwind (1) focus lead (2) to tube base panel at the tripler end replace insulation sleeve on connection (2).

NOTE

Ensure all soldered connections are smooth and connecting wires kept as short as possible, to guarantee adequate voltage clearances.

4 Connect EHT lead to CRT final anode.



NOTE: Replace the insulation sleeve on connection (2)

FIG. 4 TRIPLER REMOVAL/INSTALLATION

SWITCHED MODE POWER SUPPLY

GENERAL

The power supply is a variable frequency, self oscillating, switching flyback converter type providing mains isolation and three voltages, 18 volts, 142 volts and 200 volts. The 18V supply is used to provide a 12V stabilised supply, via IC1.

The Series 3 monitor is fitted with one of three switch mode power supply unit variants, referred to as A, B and C, which are used with either the earlier, mid or latest range of models. The power supply units function in the same way but differ only in changes to component types or values. The main difference between power supply variants A and B is that component TR2 on variant B is a different type to that on variant A. Component changes on power supply variant C are given on the circuit diagram for the power supply unit and are detailed in the parts list.

CIRCUIT DESCRIPTION

Refer to the main circuit diagram for the following circuit description, which is applicable to all three power supply unit variants. **The circuit diagram is typical for a Series 3 monitor, but reference should be made to the Parts List for details of components for individual models.**

CONTROL CIRCUIT

As TR2 turns on, a step voltage whose amplitude depends upon the instantaneous value of the rectified mains is applied across the primary of T2. The current in the winding and TR2's collector increases linearly from zero during which time energy is stored as flux in the transformer. During this period the output diodes D22, 23, 24 are reverse biased and any energy supplied to the load is via C27, 28, 31 and 26 from the previous cycle of operation.

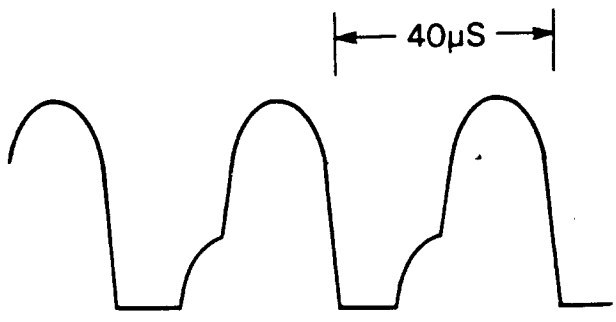
TR1 forms the error amplifier or control function, and is supplied with power from a reference winding on the transformer (nominally +30V). During the on time of TR2, the emitter TR1 is held at a constant potential W.R.T. the reference rail via D18. The base of TR1 is fed directly from the reference rail, via R3, VR4 and R5. Any voltage change on the reference rail, arising from a change of voltage at the mains output, via D23, will vary the TR1 base-emitter voltage and current. As a result, the collector current will vary causing the constant current source, used to charge C16 via R10 to vary in sympathy.

C16 charges up at a rate depending upon the amount of current available via R10, and the voltage across C16 increases exponentially until it reaches the gate-trigger voltage of the 'turn off' device TY1. Then TY1 conducts and 'crow-bars' the base drive to TR2. TR2 ceases conduction and its collector voltage becomes positive very rapidly. The dV/dT at TR2's collector is limited to a safe value by C17, R12 and D17. As this occurs, D22, 23, 24 and 21 become forward biased and stored energy within the transformer is transferred into the output capacitors and their respective loads.

During the 'off' period the base drive winding goes negative thus ensuring TR2 remains off until the next conduction period. D8, D10, D11 limit the negative off drive and so protect TY1.

Eventually, depending upon the load, the energy in the transformer is exhausted and the voltages on D6, 21, 22, 23 and 24 anodes collapse as does the TR2 collector-emitter voltage, during which time the base drive winding tends more positive. TY1 is forced off prior to this stage by negative volts on its anode, allowing TR2 to turn on. Full base drive is then sustained via R16.

HT stabilisation is achieved by controlling the duty cycle of the switching transistor. Increasing load increases the duty cycle and the peak collector current, while increasing supply mains increases the overall operating frequency. HT adjustment is performed via VR4.



TR2 BASE START-UP Fuse F3 out

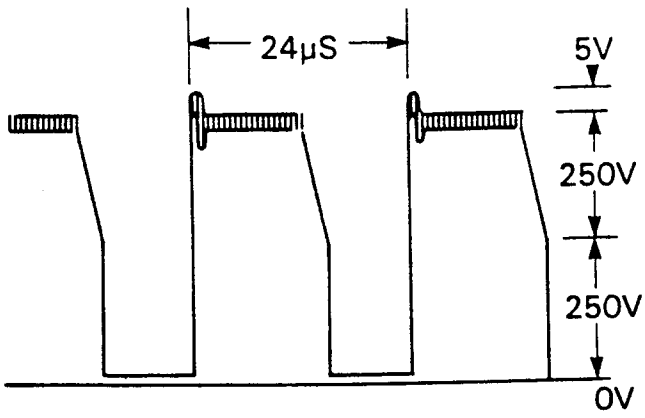
Extra damping in the form of C14, R6 and D7 is provided in order to limit the maximum Vce of TR2 to a safe value, even under fault conditions. D15, 16 provide negative off drive and base current tracking while L2 optimises the storage time of TR2 for minimum switching losses.

The maximum available power is determined by measuring the peak collector current of TR2 and is sensed by R15. If the voltage across R15 at any time exceeds the voltage across TY1 gate-cathode plus three diode drops D12, 13, 14, then TY1 is immediately brought into conduction thus turning TR2 off. This sequence of events happens during the start up sequence at low mains and under fault conditions.

START UP PROCEDURE

Start up power for the SMPSU is derived from a half wave rectified positive going differentiated pulse from the mains supply. The current required at start up is small compared with the base drive current under normal operating conditions because of the self oscillating nature of the design. Once turn on of TR2 has been achieved in this manner (once every 20 ms) the oscillation becomes self-sustaining. R8 continues to supply current even under normal operation but is swamped by the forward base drive via R16.

During the start up period the peak collector current is limited by R15. C21, R18 and 20 provide active feed forward so as to provide ripple rejection over the mains range 190-256V.



TR2 COLLECTOR Fuse F3 in - connector PL201 out (no load)

OVER VOLTAGE PROTECTION

Over voltage protection is controlled by a second feedback loop attached to TY1. This consists of a zener diode reference which senses the reference rail voltage, and hence, proportionally, the HT voltage. If this reference exceeds the zener voltage, D20 conducts, fires TY1 and terminates the drive to TR2, during which time sufficient volts are developed across TY2 gate-cathode to cause it to enter conduction and latch on. Drive to TR2 is now terminated until all the energy from C23 has been removed (10ms). The power supply is held off during this period and remains so until the presence of the next mains start up pulse, after which conduction of TR2 will again occur.

SHORT CIRCUIT PROTECTION

Short circuit or over current on any output rail represents an increase in stored energy required from the transformer T2, and therefore an increase in collector current through TR2, again this is detected by R15 and above a preset load, TY1 is fired and TR2 turned off. The supply now operates in 'Burst Mode'. This means that the power supply is initiated as under normal start up conditions once every mains cycle, but only operates for a few switching cycles during which time the over current protection again comes into operation thus terminating the drive to TR2.

MAINS INPUT CIRCUIT

This consists of a diode bridge preceded by a surge limiting thermistor and mains filter network. Degaussing is automatic at switch on and employs a dual PTC thermistor. The mains filter networks provide suitable suppression of the symmetric and assymetric radiation developed within the SMPSU concept.

NOTES

1. For the 110V power supply unit there will be certain component differences between the 240V power supply unit. These are detailed as follows:

Component	240V P.S.U.	110V P.S.U.
L1	LO001ZA1	LO001KA6
R5	RF104OJ0 10K	RM913GK0 9K1
R8	RF333JJ0 3K3	RF224GJ0 22K
R15	RQ150LJ0(1) 1R5	RO150LJ0(2) 1R5
R16	RW472ZJ5 470R	RW103XJ5 1K9W
R18	Not fitted	RF394GJ0 39K
R20	Not fitted	RF394GJ0 39K
R29	RF185DJ0 180K	RF684DJ0 68K
C10	CM564RK6 56nF	CM105NL6 0.1µF
C11	CA108RM6 100µF	CA228QM7 220µF
C21	Not fitted	CM105RK6 0.1µF
TH1	RT005QN0	RT002QL0
T2	TI0004I06	TL002SU0 (3960)
F1	KA2001BA0 2A	KA3151BA0 3.15A
F2	KA2001BA0 2A	KA3151BA0 3.15A
F3	KA1001BQ0 1A	KA2001BQ0 2A

2. Later version power supplies have the following changes:

240V	110V
R1 — Removed	R1 — Removed
D5 — Wire link	D5 — Wire link
C10 — 22K Res. ½W	C10 — Wire link
R8 — 22K Res. ½W	R8 — 22K Res. ½W

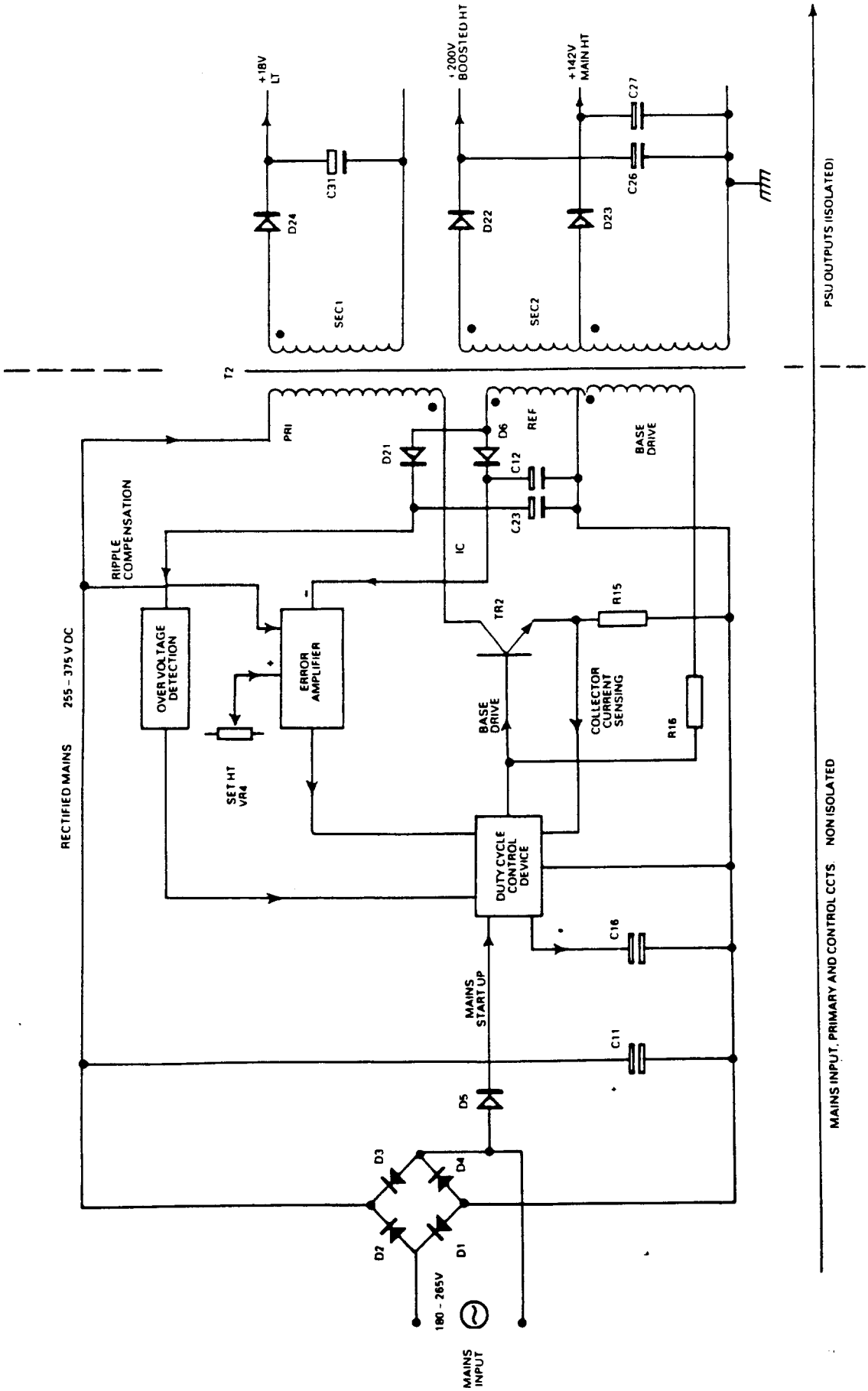


FIG. 1 SWITCHED MODE POWER SUPPLY CONCEPT : SIMPLIFIED CIRCUIT DIAGRAM

LINE OUTPUT STAGE

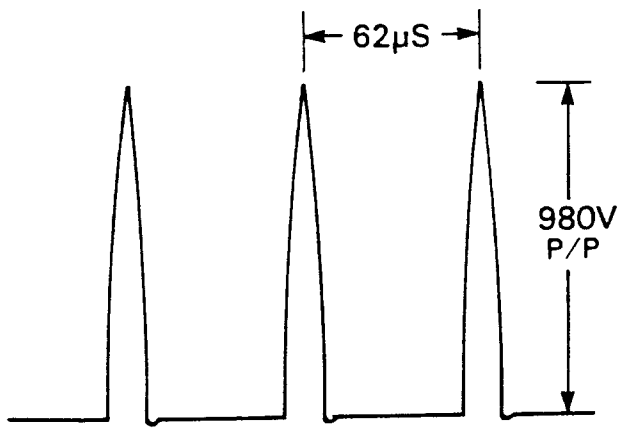
LINE OUTPUT (Refer to Main Circuit Diagram)

L202, L203 and T202 primary, are tuned during the flyback period by C222; this lasts for 11.8µs.

Line output transistor, TR202, is driven directly from the secondary winding of T201, 'ON' current is controlled by R227, turn off dissipation is minimised by L204

Line linearity correction is provided by L203, which is damped by C217, R230. 'S' correction is provided by C218.

Field timebase +25V (IC301), is achieved by rectifying a negative going flyback voltage from a secondary winding on line output transformer. A fusable resistor provides CRT protection under possible fault conditions.



TR202 COLLECTOR with 100 to 1 scope probe

EHT SUPPLY

The 23.5kV required for the CRT is generated by a tripler module driven from a 7.5kV overwind on transformer T203. Inductance of the transformer (between primary and overwind), is tuned to the 7th harmonic of the flyback frequency by tripler input capacitance and self capacitance of the overwind.

The 'breathing' performance of the display is further improved by deriving a high focus potential from a resistive thick film/substance potential divider from the EHT, giving rise to a constant bleed current from EHT, thus lowering output impedance of the EHT circuit.

An extra input diode within the tripler has its anode connected to the tube base ground and via a beam current sensing circuit to 0V. C223 and a network of resistors provide a load for the diode and effectively damp out ringing which may occur during scan. The resulting 1000V which occurs across C223 is used to generate A1 potential across CRT.

HT SUPPLY

The HT supply is derived from the main secondary winding of the switch mode power supply via R231. R231 is chosen to optimise picture breathing performance and offer protection to TR202, during CRT flashover.

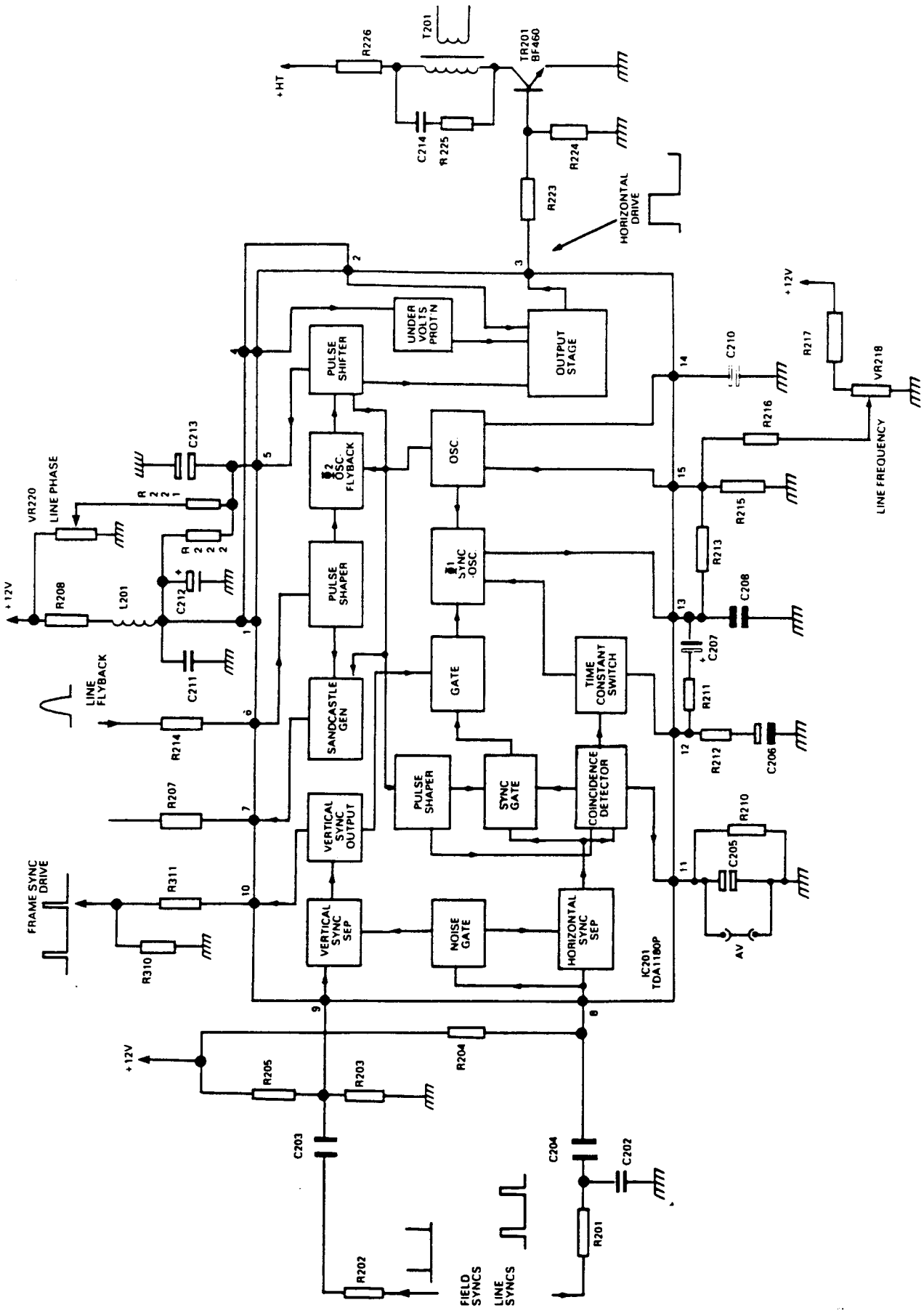


FIG. 1 LINE TIMEBASE : SIMPLIFIED CIRCUIT DIAGRAM - IC201

VIDEO INPUT INTERFACE CIRCUIT

INPUT

Connections are made at PL101-red, green and blue video, sync options 1, 2, 3 and TTL video normal/invert. All inputs are flashover protected by resistors and diodes. R,G,B drives are split in two ways:

1. Test selectable links PL103, R,G,B.

2. To IC101.

TEST SELECTABLE LINKS PL103

SELECT POSITION 1

The input stage is in the linear mode, the video is buffered and level shifted by emitter output stages. These provide temperature tracking with TR103, 104 and 105 resulting in a stable black level.

NOTE

In the linear mode only brightness variations of the video information are possible using VR314.

SELECT POSITION 2

TR103, 104 and 105 bases are driven by IC101. This option is used when driving from TTL video sources offering primary/secondary colour and black and white drives.

NOTE

In the TTL mode, signal to noise immunity of system is very good. IC101 can be used with negative TTL level video drives (R,G,B), in order to invert video information.

Video inversion is achieved by toggling video polarity select line at PL101 pin 2 or TL101:

Normal - 0V
Invert - +5V

TTL MODE

Contrast of video information is tracked by varying available potential across open collector load resistors, R114, 115 and 116 which are supplied by TR101 from +12V, the base being driven from the contrast control slider VR111. R112, C101 form a low pass filter and ensure smooth operation of contrast control.

CRT BEAM CURRENT

Information is fed to D117, 118, from a constant current source derived from 124V main HT rail. As CRT beam current increases D117, 118 junctions become more negative thus: D117 conducts more heavily causing voltage to TR106 base to decrease. R136, C105 filter the signal, the derived voltage is emitter followed and supplies TR103, 104 and 105 emitters directly. Hence increases in CRT beam current, above a preset limit achieving an automatic reduction in picture brightness.

NOTE

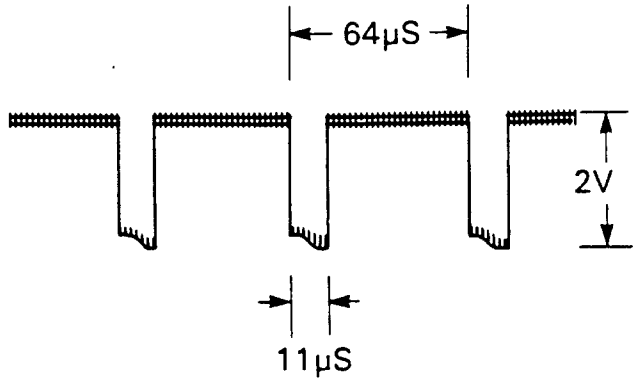
CRT beam limiting is preset depending on monitor model.

Brightness of display in all modes is adjusted by VR134 enabling parallel adjustment of R,G,B and black levels within a + or −20V range from nominal:

400uA - High and medium resolution
700uA - 14" standard resolution TTL/Linear
900uA - 20" standard resolution TTL/Linear

TR102

A fast switching transistor used to derive mixed blanking pulses for flyback blanking of video information. The base is driven from a potential divider/mixer network, from a line flyback pulse and a frame flyback pulse. Line flyback is advanced in phase with C225, to allow for transistor switching delays. D107 holds TR102 in a semi-saturation state.



TR102 COLLECTOR

IC101

IC101 is also used to provide the following sync options:

COMPOSITE NEGATIVE SYNC

Fed in on PL101, pin 7, ensure TL102 in non-active position, allowing pin 2 of IC101, to be pulled high whereupon IC101 performs a sync inversion and provides an attenuated positive sync waveform for driving sync separators of IC201, via R201 and TL106.

COMPOSITE POSITIVE SYNC

Fed in on PL101, pin 7 with TL102 in its grounded position. IC101, now provides an output in phase with input and of suitable amplitude for driving IC201 directly, via R201 and TL106.

SEPARATE NEGATIVE LINE AND FIELD SYNCS

Ensure TL102 in non-active position, line syncs are fed in on PL101, pin 5. IC101 performs an exclusive OR function, the output being an inverted composite sync waveform.

SEPARATE POSITIVE LINE AND FIELD SYNCS

Fed in on PL101, pin 7 in its grounded position. TL106, is switched over to inverse field option. IC101, provides an attenuated and buffered line sync feed for IC201, via R201. Positive field sync information is fed directly PL101, pin 3 'sync 3' input by TL106(B) and R202.

CIRCUIT DESCRIPTION (See FIG. 1)

LINE TIMEBASE

Line oscillator function is based on IC201, providing three outputs:

1. Horizontal drive pulses for control of line output stage.
2. Vertical sync pulses compatible with synchronisation of IC301 field output IC.
3. A sandcastle pulse providing burst gate and clamp information.

NOTE

This facility is only used with IC TDA3301, currently required by '1 volt 75 ohm' linear/PAL input monitors.

SYNC SEPARATOR

IC201 (TDA1189P), incorporates separate noise gated sync separators for line/field syncs, which accepts positive going sync pulses (or negative going composite video) on pins 8 and 9.

Output pulses from the line sync separator are used in conjunction with a sync gate to synchronise line oscillator in a phase locked loop circuit.

LINE OSCILLATOR - PHASE DETECTORS

The line oscillator is timed by a network of resistors and capacitors on pins 14 and 15 of IC201, used to derive a pulse of suitable mark space ratio for driving line output stages.

IC201 contains two basic control loops, each containing a phase detector.

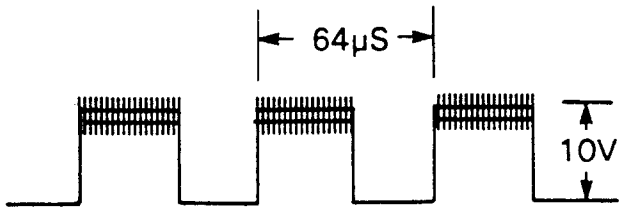
1. The first phase detector compares output of the line oscillator with the incoming line sync pulse. Phase detector output on pin 13 is filtered and fed to the voltage control input of the oscillator on pin 15.
2. The second phase detector, compensates for delays introduced by the line output stage and compares line flyback pulses at pin 6 with oscillator output. Phase detector output consists of a bi-directional current source used to charge/discharge C213 on pin 5. Voltage derived from C213 is used to control a phase shifter, which regulates the phase of the output pulse on pin 3. Pin 5 also provides a 'line shift' function, by offsetting voltage developed across C213 charged from VR220, R221 and R222 allowing phase shift of + or −1us, between line scan and video information.
3. A 7us gate pulse from the line oscillator, whose phase position is centred around the horizontal sync pulse. The gated pulse is used to control line arrival of sync pulses at the sync phase detector for a duration of 7us, allowing latching and de-latching of line oscillator. Obtained by a coincidence detector which compares the phase gate pulse with that of incoming syncs.
4. When the two signals are not aligned, the coincidence detector is used to switch p.l.l. filter into a short time constant mode, giving a high input impedance at pin 12, thus increasing sensitivity and loop gain of oscillator. The phase locked loop now has a low noise immunity but has a very wide capture range. When aligned coincidence detector activates the time constant switch, causing low impedance on pin 12, achieving a lower sensitivity and loop gain, but providing a high degree of noise immunity. During the 'locked' condition the p.l.l. operates with a long time constant.

NOTE

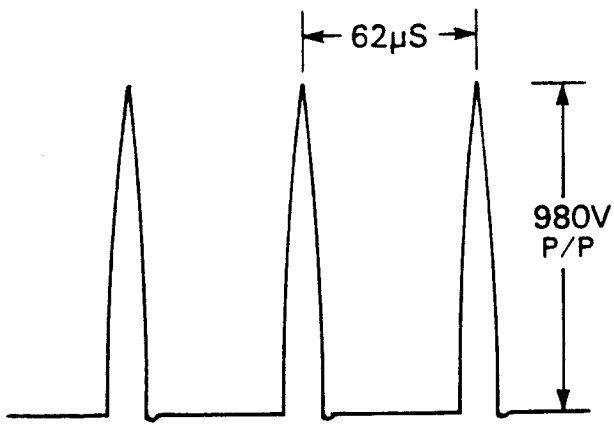
A short time constant mode can be achieved manually by connecting the output of the coincidence detector on pin 11 to ground allowing the oscillator to follow rapid fluctuations in line period, which may occur on some non-standard signals.

LINE DRIVER STAGE

Horizontal drive pulses from pin 3 (IC201) are DC coupled to TR201 and used to control driver transformer (T201), providing the impedance conversion necessary to provide 600mA forward base current, for saturation of line output transistor (TR202). Ringing is damped by R225 and C214 at TR201 turn off, thus limiting its Vce to a safe value. HT supply to the line driver comes from main HT supply rail, prior to E231 and HT scan interlock (PL201 pins 5/6) allowing its operation to be checked independently of the line output stage.



IC201 Pin 3



TR202 COLLECTOR

VERTICAL SYNC OUTPUT

Output of field sync separator is used to drive vertical sync output stage on pin 10 (IC201).

In addition, this pulse is used internally to inhibit the first phase detector during the field sync period, thus preventing 'top flutter' as a result of equalising pulses.

SANDCASTLE PULSE

Sandcastle pulse is on pin 7 (IC201), used on models with linear interface PCB assembly consisting of two sections.

1. Upper portion, suitable for burst gate and clamping operations from the horizontal oscillator, thus ensuring an accurate phase relationship with the video information.
2. Lower portion, derived from a line flyback 'slice' for line blanking.

FIELD TIMEBASE

CIRCUIT DESCRIPTION (refer to FIG. 1)

The field timebase function is carried out by IC301. Oscillator frequency is determined by VR307, R308 and C303, producing a 100us output pulse at pin 12. Field sawtooth is derived from potential across C305 and C306 as they change towards +25V supply via R304, R305, VR306 and R301. When field scan is completed the 100us pulse discharges C305 and C306, ready for charging cycle to be restarted.

FIELD LINEARITY

Sawtooth output on pin 1 of IC301 via R313 and VR312 (field linearity control).

FIELD FLYBACK

In order to achieve a short field flyback time, a supply voltage larger than required during scan must be applied to field deflection coils during flyback period. Made possible by using a separate field flyback generator, within IC301.

Main HT supply for IC301 is supplied to pin 5 via D302. During flyback the generator doubles the supply on pin 5, the potential on pin 3 is switched from 0V during scan to +25V during flyback. The change in voltage occurs on pin 5 via C304 causing potential to double during flyback.

D302 isolates pin 5 from +25V supply. When deflection coil field has collapsed and potential across field scan coils has fallen below +25V pin 3 is switched back to 0V and scan cycle resumed.

Synchronisation of IC301 is achieved by feeding a positive (going) field sync pulse on pin 8 of IC301.

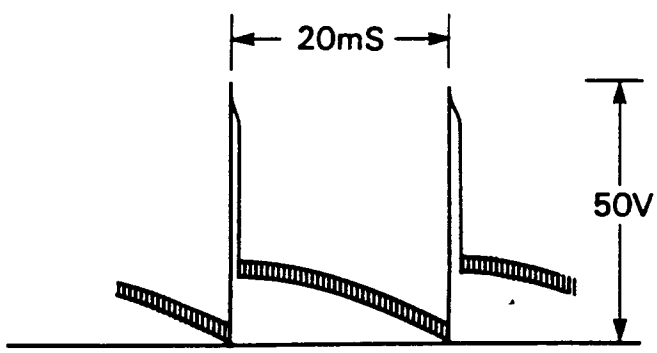
HT SUPPLY for IC301

HT for IC301 is derived from a scan rectified rail from the line output stage. C305, C306 are fed via VR306 (height control) from scan rectified supply and 12V rail. Proportions of current and associated time constants R303, C301 and DF301 are used to minimise "picture bounce" thus maintaining accurate tracking of the field scan with line scan amplitude during CRT beam current variations, therefore reducing picture "breathing" effects.

FIELD OUTPUT

Sawtooth output on pin 1 is applied to output stage (within IC301) and scan output is available from pin 4 to field deflection coils. Current within coils is sampled by R323, then fed back via R317 to the virtual earth input pin 10 of IC301.

Gain of output amplifier is set by the ratio of R314 and R317 and DC operating point by R318 and R316.



IC301 Pin 4 with 10 to 1 scope probe

PICTURE GEOMETRY

CRT E-W pincushion distortion is corrected by modulation of line deflection current in transductor (T202) actively driven by TR301, which is then fed from the parabolic waveform at the top of the S correction capacitor C311. AC gain from the amplifying driver is used to control amount of correction applied to CRT.

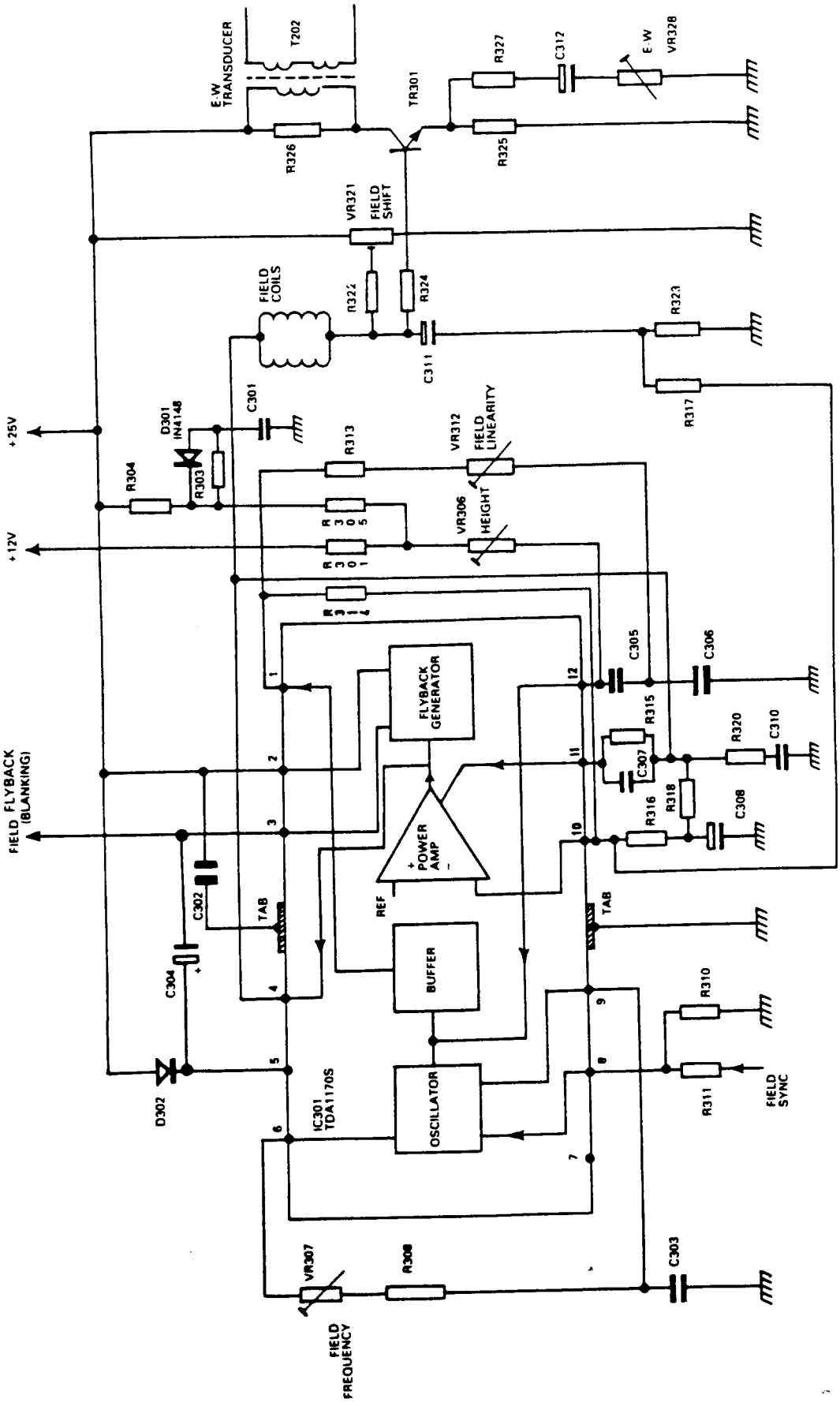


FIG. 1 FIELD TIMEBASE : SIMPLIFIED CIRCUIT DIAGRAM - IC301

CRT TUBE BASE PANEL (refer to Main Circuit Diagram)

CIRCUIT DESCRIPTION

All CRT electrodes are protected by a resistor, capacitor and spark gap. Spark gaps on all electrodes (except focus) are formed by a 1-2kV ring trap gap, positioned within CRT base socket assembly. High focus voltage has a separate 10kV spark gap contained within tube base socket.

CRT cathodes are stood off from video outputs by 220 ohm resistors, the grid by 100k and A1's 820k. Decoupling of grid and A1's is achieved by C910 and C911.

Focus voltage is provided by a potential divider located within tripler module, providing an adjustable voltage of 5-8kV.

A1 voltage is adjusted by VR932, offering a range of 350-280 volts.

CRT heaters may be disconnected by removing TL901, in order to make video adjustments.

CRT cathodes are directly driven from video output stages mounted on CRT panel.

VIDEO OUTPUT STAGES - CIRCUIT DESCRIPTION AND OPERATION

NOTE

Red, Green and Blue video outputs are identical; the following text refers to the Red output stage.

TR902 forms a class 'A' amplifier, AC gain is derived from the ratio of R935 to R902, VR903 and DC gain by a DC offset current from R905 and VR906.

R904 forms video output load and TR902 represents a low impedance drive source to CRT input capacitance during its conduction. During turn off of TR902, the source impedance of the load R904 is considerably reduced by TR901, ensuring a good 'pull-up' performance.

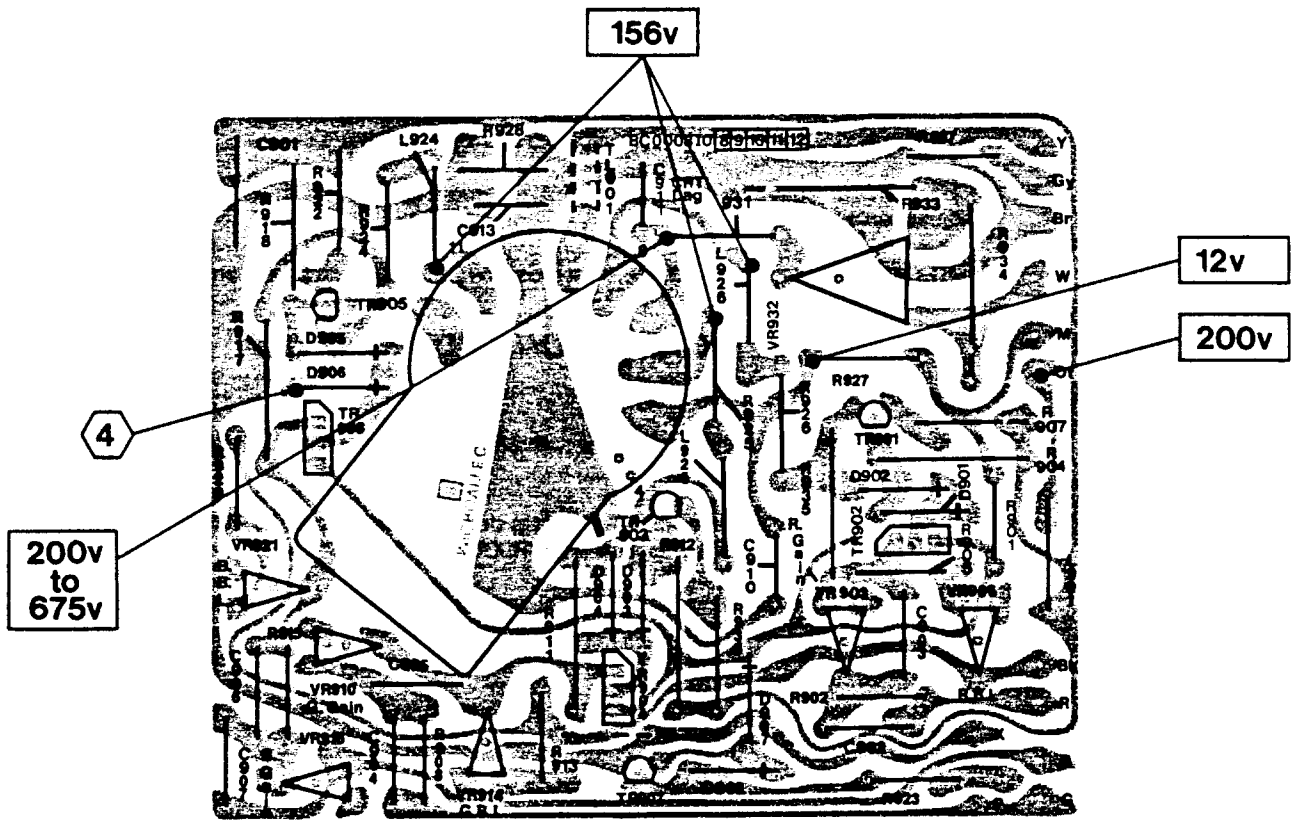
Video compensation is achieved by split capacitances, C902, C903 to help maintain a constant amplifier response curve over the full range of VR903.

The emitters of TR902, TR904 and TR906 are connected together with a DC reference of approximately 7.5V, used to set video black level voltage.

TR907 performs field blanking of video information.

1. TR907 is driven by negative (going) blanking pulses from TR102, TR907 conducts providing a 7.5V black level reference.
2. During field flyback TR907 is turned off, forcing video outputs off.
3. Beam current information is sensed on tube base panel resistively, across line output ground to 0V line by R937, D117, D118 on main PCB.

CRT TUBE BASE PANEL

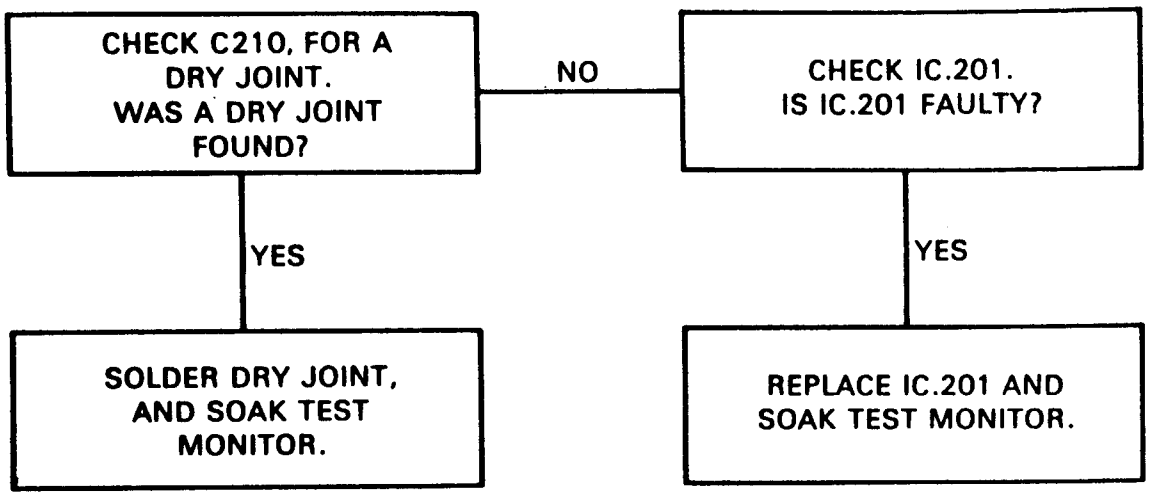


DENOTES TEST WAVEFORM MEASURING POINT

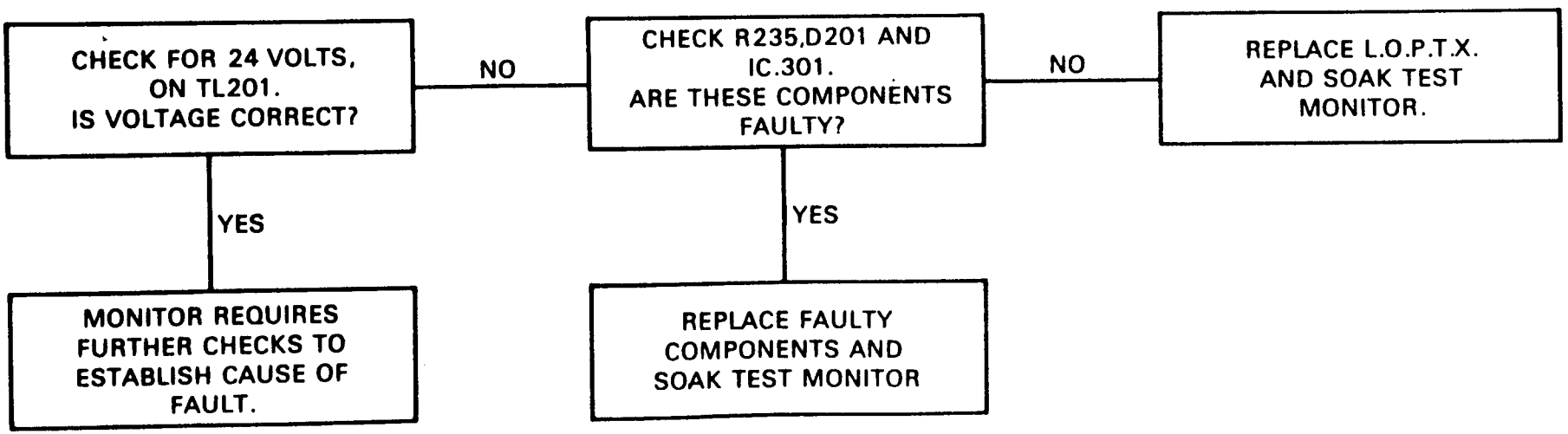
DENOTES TEST VOLTAGE MEASURING POINT

SERIES 3 CRT TUBE BASE PANEL - TRACK (SOLDER) SIDE
VIEWED THROUGH PCB FROM COMPONENT SIDE

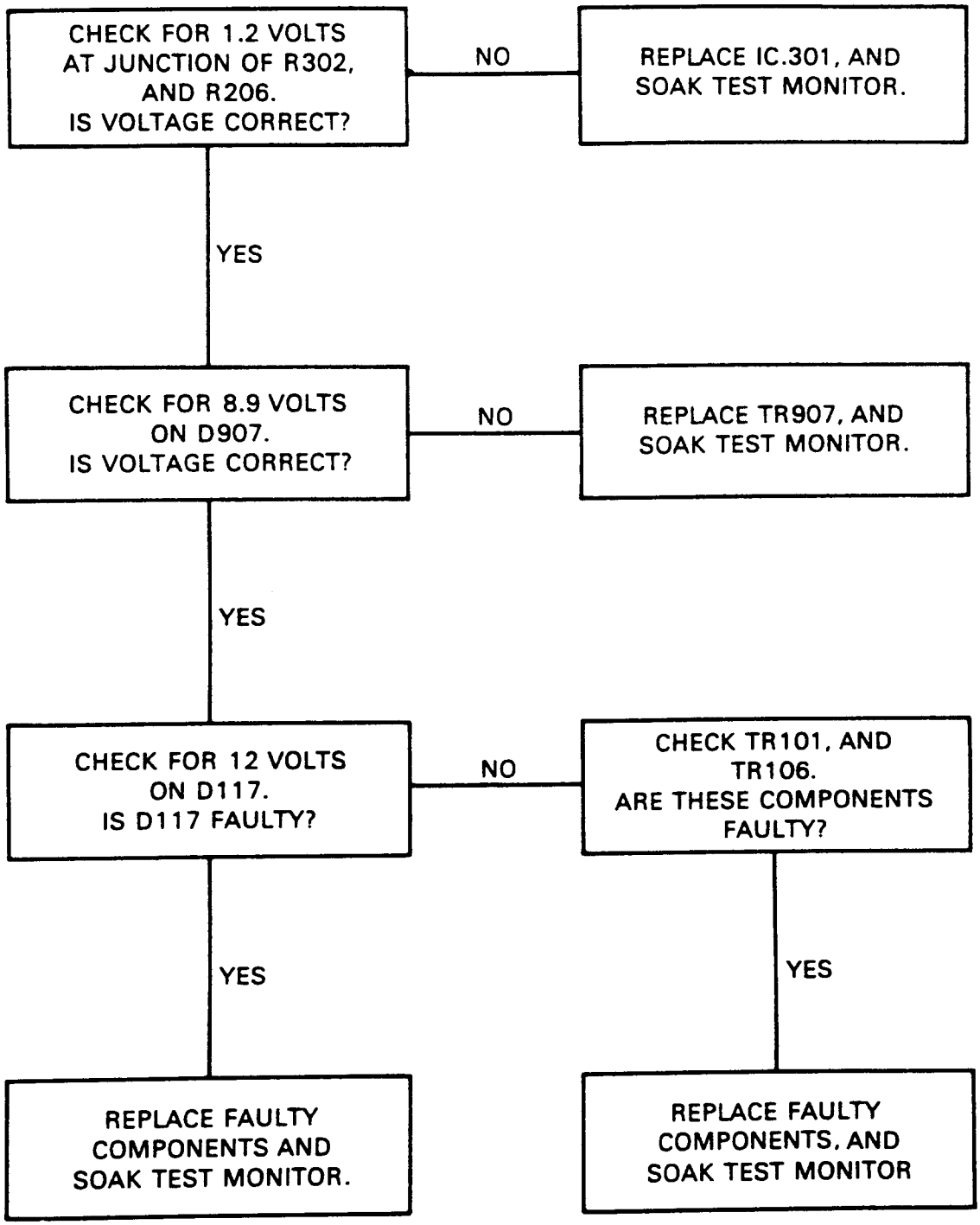
INTERMITTENT –
LINE SYNC


CHECK C210, FOR A DRY JOINT. WAS A DRY JOINT FOUND?
NO
CHECK IC.201. IS IC.201 FAULTY?
YES
YES
SOLDER DRY JOINT, AND SOAK TEST MONITOR.
REPLACE IC.201 AND SOAK TEST MONITOR.

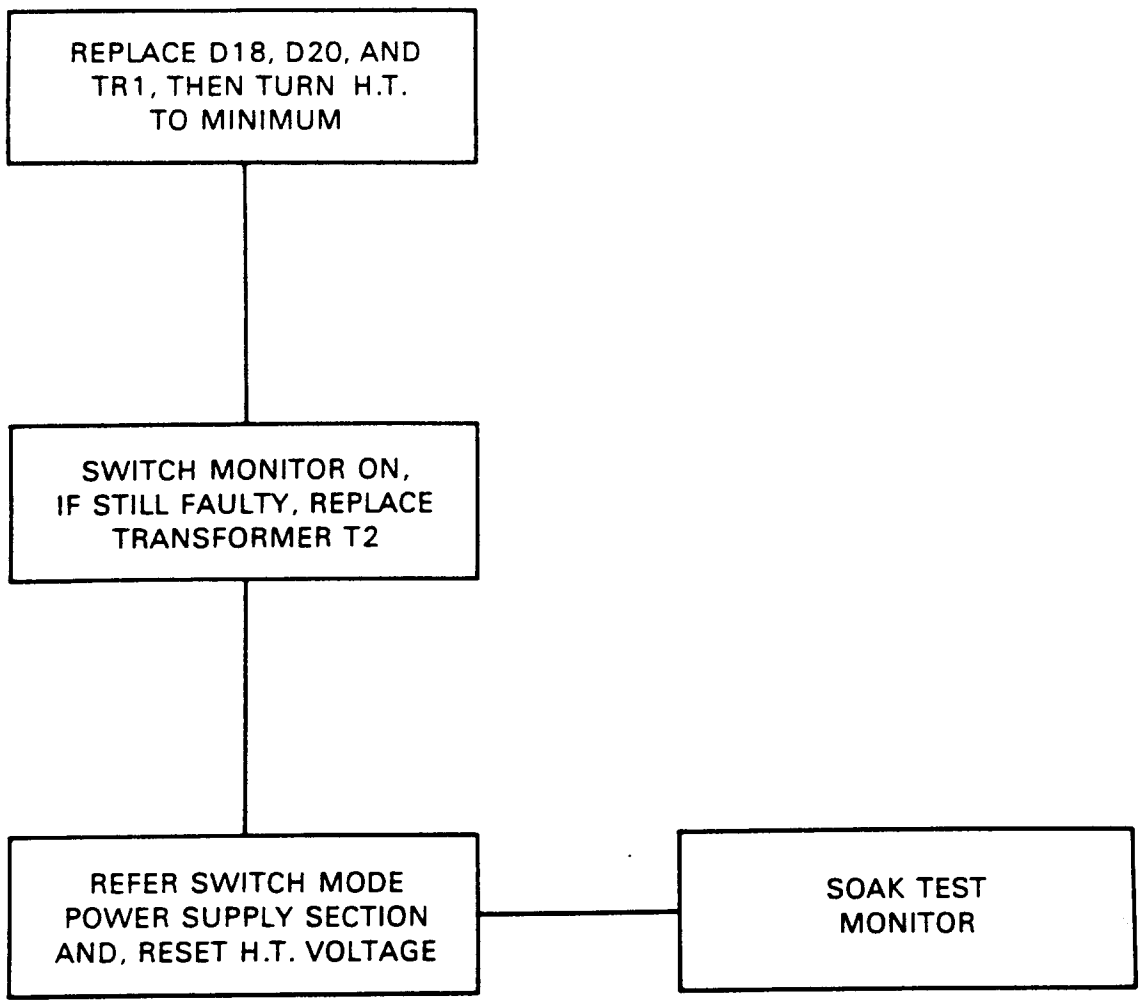
FRAME COLLAPSE

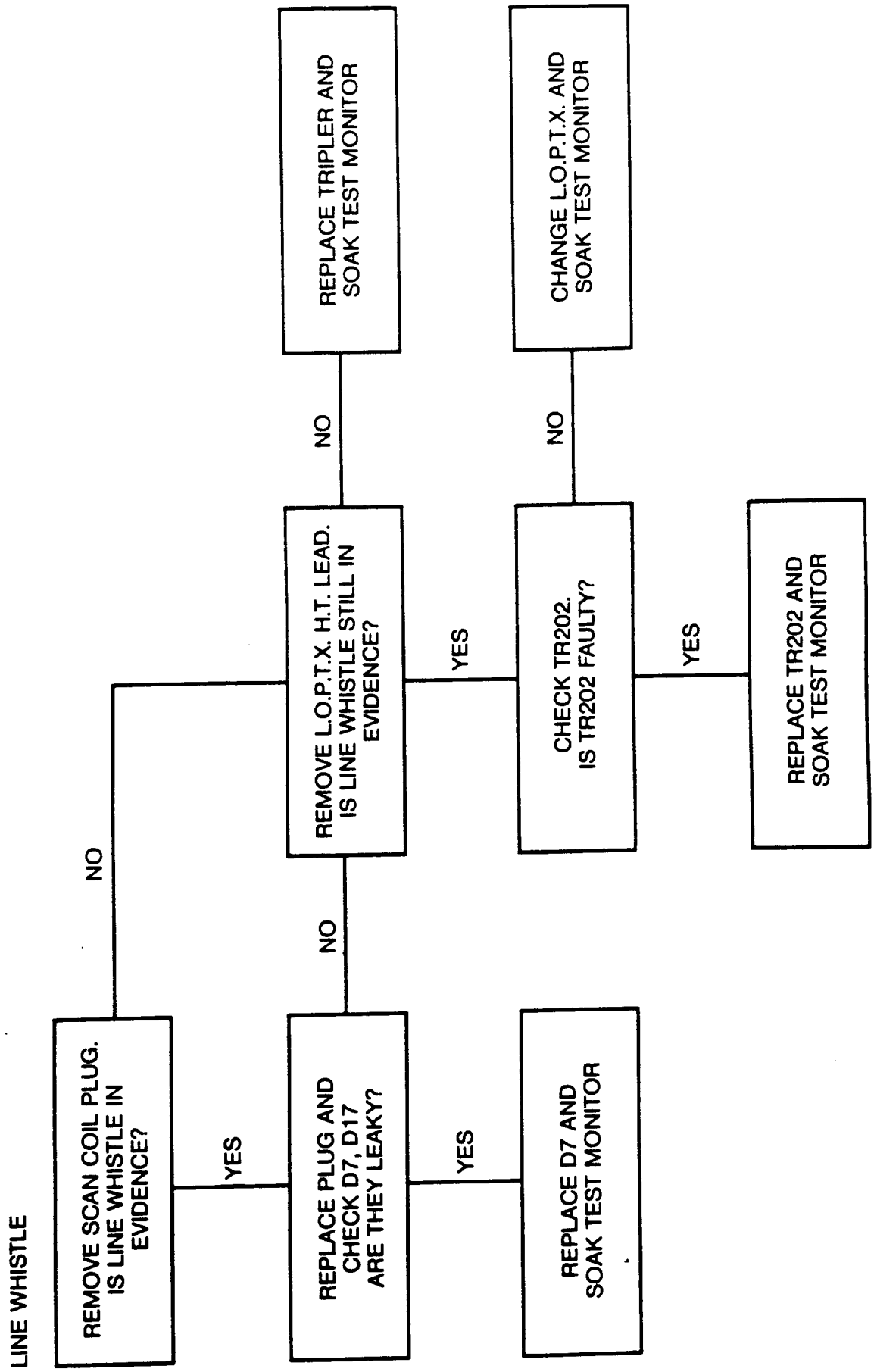

CHECK FOR 24 VOLTS, ON TL201. IS VOLTAGE CORRECT?
NO
CHECK R235,D201 AND IC.301. ARE THESE COMPONENTS FAULTY?
NO
REPLACE L.O.P.T.X. AND SOAK TEST MONITOR.
YES
YES
MONITOR REQUIRES FURTHER CHECKS TO ESTABLISH CAUSE OF FAULT.
REPLACE FAULTY COMPONENTS AND SOAK TEST MONITOR

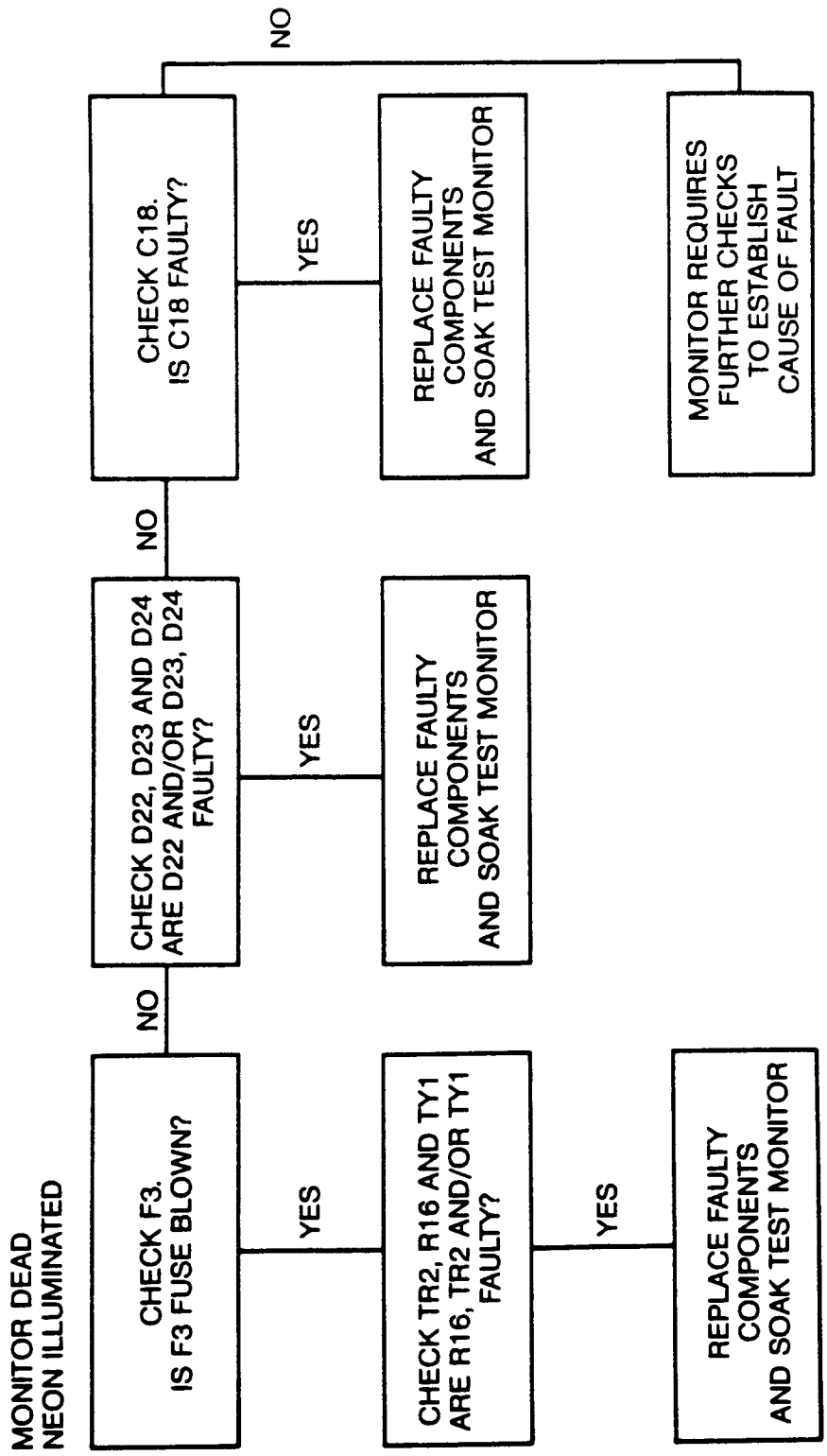
FLYBACK LINES

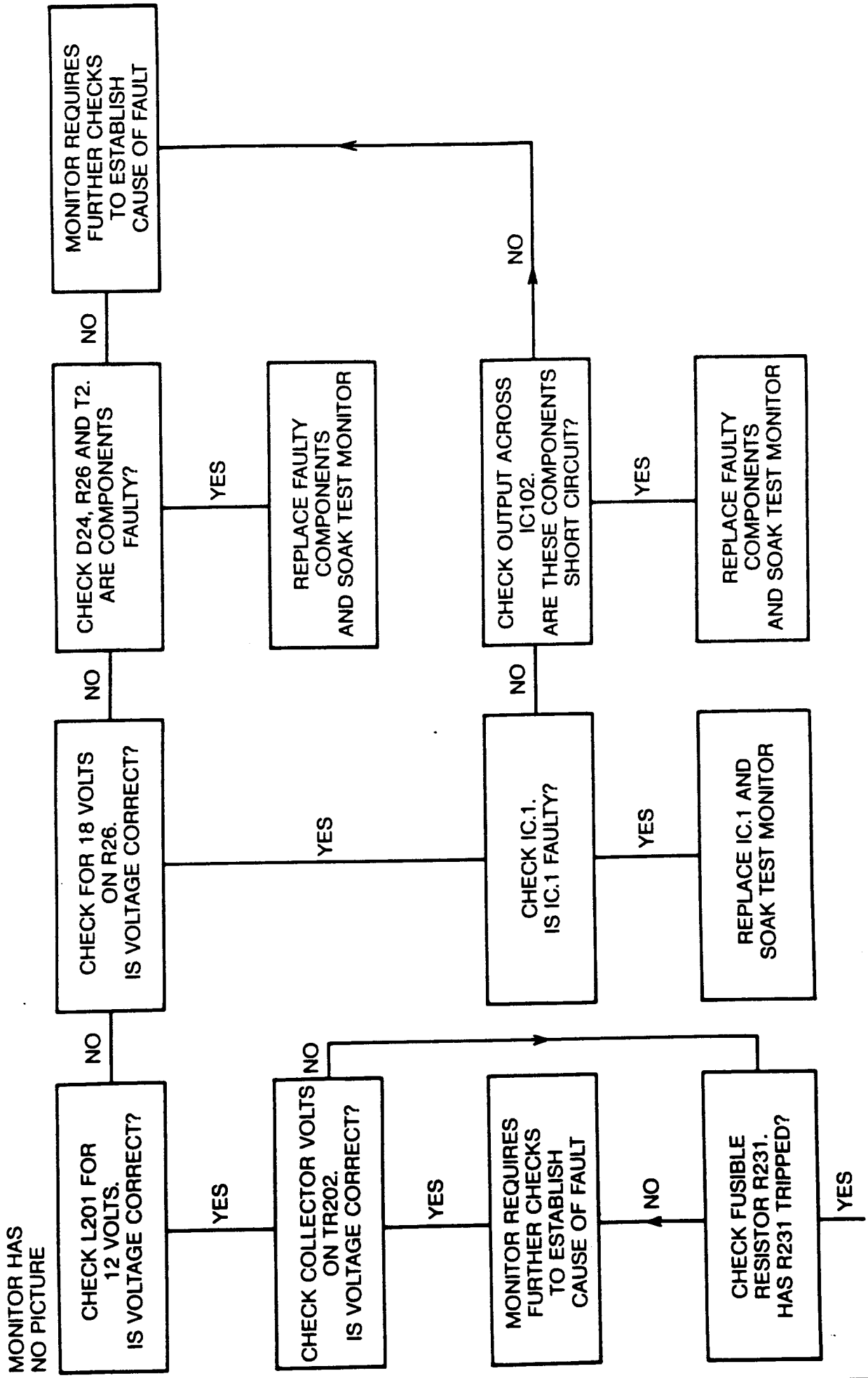

CHECK FOR 1.2 VOLTS AT JUNCTION OF R302, AND R206. IS VOLTAGE CORRECT?
NO
REPLACE IC.301, AND SOAK TEST MONITOR.
YES
CHECK FOR 8.9 VOLTS ON D907. IS VOLTAGE CORRECT?
NO
REPLACE TR907, AND SOAK TEST MONITOR.
YES
CHECK FOR 12 VOLTS ON D117. IS D117 FAULTY?
NO
CHECK TR101, AND TR106. ARE THESE COMPONENTS FAULTY?
YES
YES
REPLACE FAULTY COMPONENTS AND SOAK TEST MONITOR.
REPLACE FAULTY COMPONENTS, AND SOAK TEST MONITOR

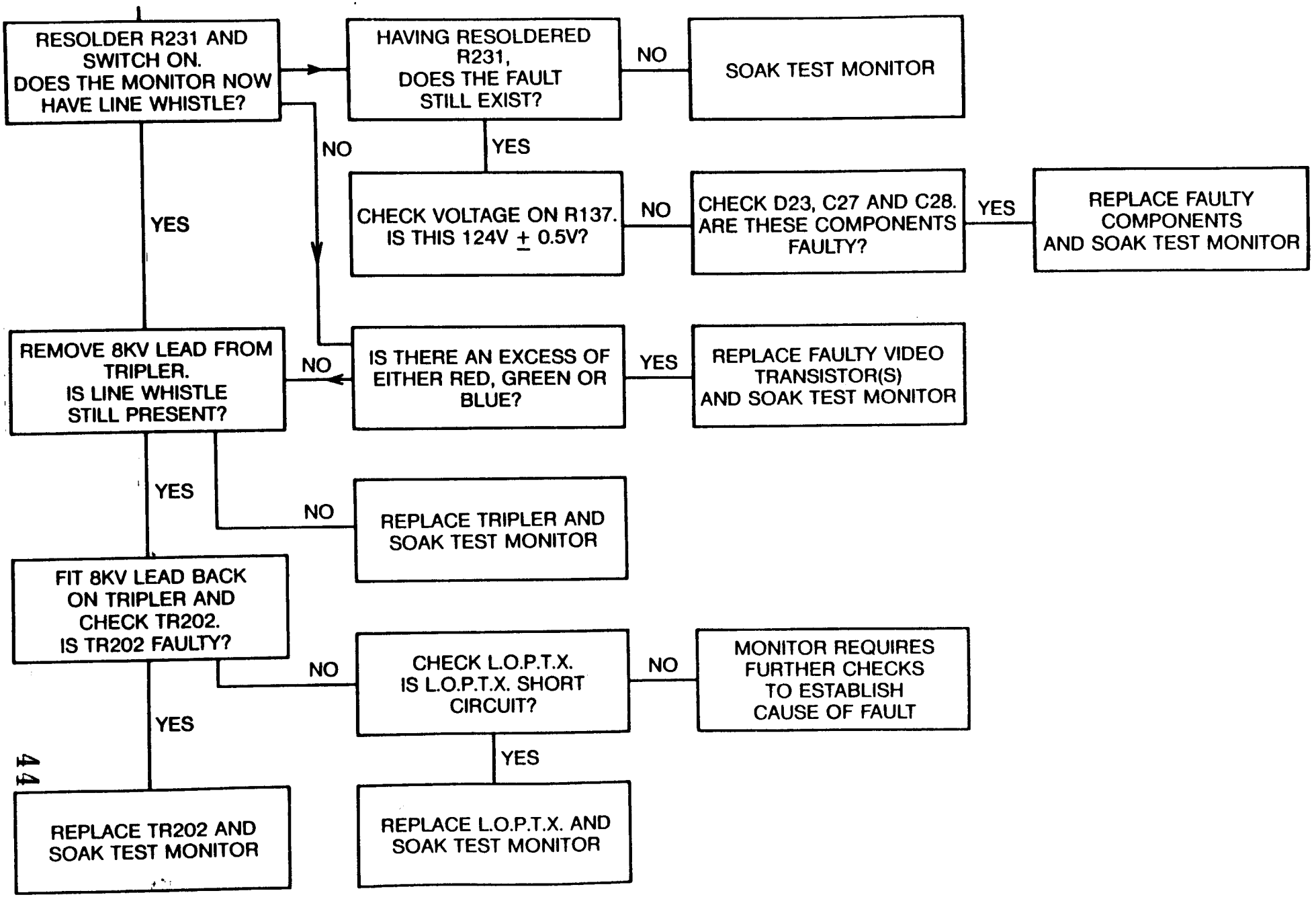
BURST MODE

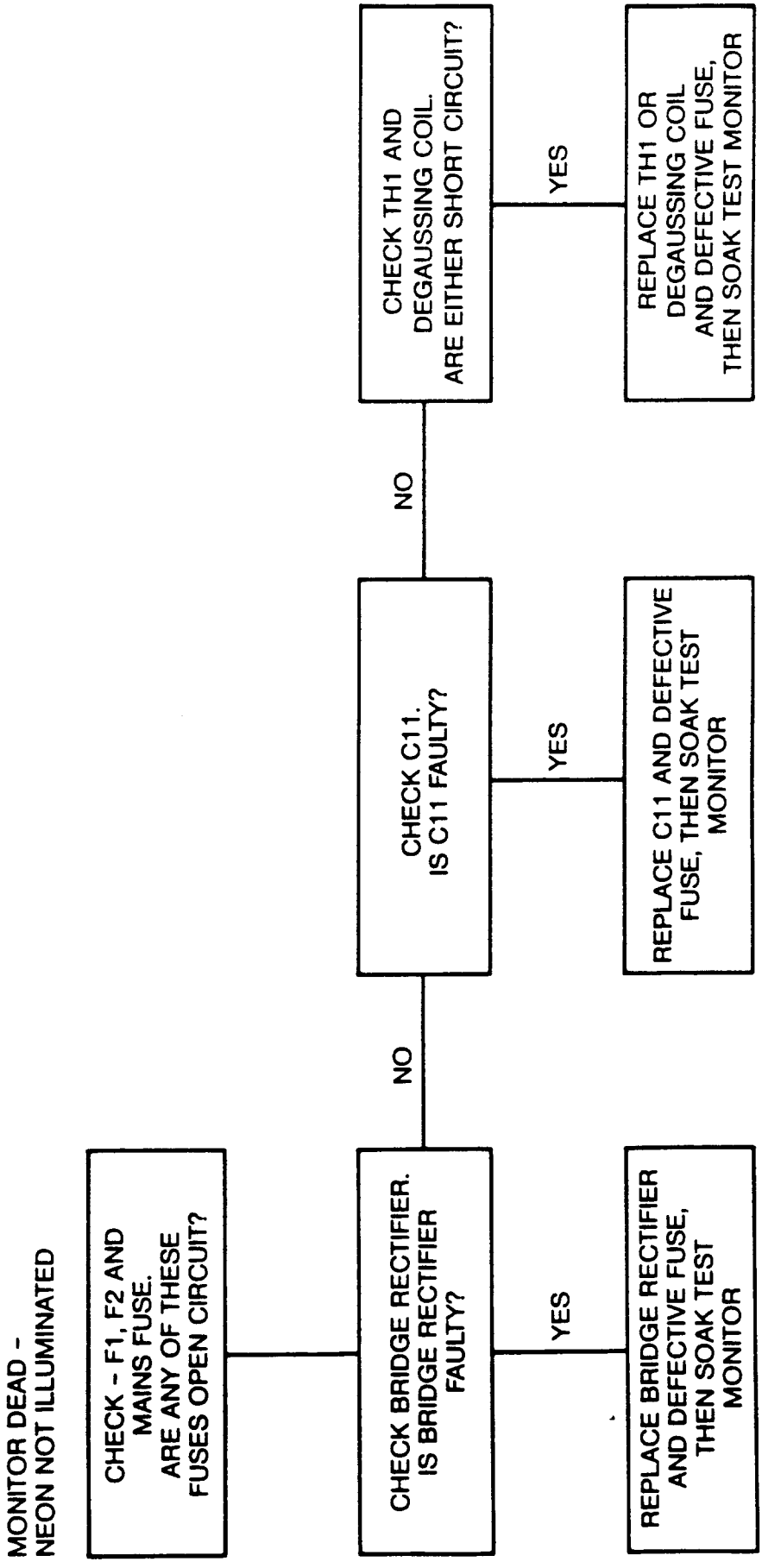

REPLACE D18, D20, AND TR1, THEN TURN H.T. TO MINIMUM
SWITCH MONITOR ON, IF STILL FAULTY, REPLACE TRANSFORMER T2
REFER SWITCH MODE POWER SUPPLY SECTION AND, RESET H.T. VOLTAGE
SOAK TEST MONITOR


LINE WHISTLE
REMOVE SCAN COIL PLUG. IS LINE WHISTLE IN EVIDENCE?
YES
NO
REPLACE PLUG AND CHECK D7, D17 ARE THEY LEAKY?
YES
NO
REPLACE D7 AND SOAK TEST MONITOR
REMOVE L.O.P.T.X. H.T. LEAD. IS LINE WHISTLE STILL IN EVIDENCE?
YES
NO
REPLACE TRIPLER AND SOAK TEST MONITOR
CHECK TR202. IS TR202 FAULTY?
YES
NO
REPLACE TR202 AND SOAK TEST MONITOR
CHANGE L.O.P.T.X. AND SOAK TEST MONITOR


MONITOR DEAD
NEON ILLUMINATED
CHECK F3.
IS F3 FUSE BLOWN?
NO
YES
CHECK TR2, R16 AND TY1
ARE R16, TR2 AND/OR TY1
FAULTY?
YES
REPLACE FAULTY
COMPONENTS
AND SOAK TEST MONITOR
CHECK D22, D23 AND D24
ARE D22 AND/OR D23, D24
FAULTY?
NO
YES
REPLACE FAULTY
COMPONENTS
AND SOAK TEST MONITOR
CHECK C18.
IS C18 FAULTY?
NO
YES
REPLACE FAULTY
COMPONENTS
AND SOAK TEST MONITOR
MONITOR REQUIRES
FURTHER CHECKS
TO ESTABLISH
CAUSE OF FAULT


MONITOR HAS NO PICTURE
CHECK L201 FOR 12 VOLTS. IS VOLTAGE CORRECT?
NO
YES
CHECK COLLECTOR VOLTS ON TR202. IS VOLTAGE CORRECT?
NO
YES
MONITOR REQUIRES FURTHER CHECKS TO ESTABLISH CAUSE OF FAULT
NO
CHECK FUSIBLE RESISTOR R231. HAS R231 TRIPPED?
YES
CHECK FOR 18 VOLTS ON R26. IS VOLTAGE CORRECT?
NO
YES
CHECK D24, R26 AND T2. ARE COMPONENTS FAULTY?
NO
YES
REPLACE FAULTY COMPONENTS AND SOAK TEST MONITOR
MONITOR REQUIRES FURTHER CHECKS TO ESTABLISH CAUSE OF FAULT
CHECK IC.1. IS IC.1 FAULTY?
NO
YES
REPLACE IC.1 AND SOAK TEST MONITOR
CHECK OUTPUT ACROSS IC102. ARE THESE COMPONENTS SHORT CIRCUIT?
NO
YES
REPLACE FAULTY COMPONENTS AND SOAK TEST MONITOR


RESOLDER R231 AND SWITCH ON. DOES THE MONITOR NOW HAVE LINE WHISTLE?
HAVING RESOLDERED R231, DOES THE FAULT STILL EXIST?
NO
SOAK TEST MONITOR
YES
NO
YES
CHECK VOLTAGE ON R137. IS THIS 124V ± 0.5V?
NO
CHECK D23, C27 AND C28. ARE THESE COMPONENTS FAULTY?
YES
REPLACE FAULTY COMPONENTS AND SOAK TEST MONITOR
REMOVE 8KV LEAD FROM TRIPLER. IS LINE WHISTLE STILL PRESENT?
NO
IS THERE AN EXCESS OF EITHER RED, GREEN OR BLUE?
YES
REPLACE FAULTY VIDEO TRANSISTOR(S) AND SOAK TEST MONITOR
YES
NO
REPLACE TRIPLER AND SOAK TEST MONITOR
FIT 8KV LEAD BACK ON TRIPLER AND CHECK TR202. IS TR202 FAULTY?
NO
CHECK L.O.P.T.X. IS L.O.P.T.X. SHORT CIRCUIT?
NO
MONITOR REQUIRES FURTHER CHECKS TO ESTABLISH CAUSE OF FAULT
YES
YES
REPLACE TR202 AND SOAK TEST MONITOR
REPLACE L.O.P.T.X. AND SOAK TEST MONITOR


MONITOR DEAD -
NEON NOT ILLUMINATED
CHECK - F1, F2 AND MAINS FUSE. ARE ANY OF THESE FUSES OPEN CIRCUIT?
CHECK BRIDGE RECTIFIER. IS BRIDGE RECTIFIER FAULTY?
YES
REPLACE BRIDGE RECTIFIER AND DEFECTIVE FUSE, THEN SOAK TEST MONITOR
NO
CHECK C11. IS C11 FAULTY?
YES
REPLACE C11 AND DEFECTIVE FUSE, THEN SOAK TEST MONITOR
NO
CHECK TH1 AND DEGAUSSING COIL. ARE EITHER SHORT CIRCUIT?
YES
REPLACE TH1 OR DEGAUSSING COIL AND DEFECTIVE FUSE, THEN SOAK TEST MONITOR

PARTS LISTING SERIES 3, MODEL 1431/MS4

For identification of parts refer to the Drive/Deflection and Tube Base PCB Circuit Diagram for Model 1431/MS4 in the Drive/Deflection PCB Diagrams Section.

MAIN PCB

NOTE

Due to the fact that some monitors may have different component values to those listed below, please replace damaged items with components of identical value. If there is any doubt, consult the manufacturer.

COMP. REF.	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R3		RF393DJ0	3K9 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR4		RQ103AL2	1K PRESET POT CARB. MIN. H MTG 20% 0.1W AXIAL
R5		RF104DJ0	10K CARBON FILM RESISTOR 5% 0.25W AXIAL
R6		RW154VJ6	15K WW RESISTOR 5% 7W RADIAL
R7		RF471DJ0	47R CARBON FILM RESISTOR 5% 0.25W AXIAL
R8		RF224GJ0	22K CARBON FILM RESISTOR 5% 0.5W AXIAL
R10		RF392DJ0	390R CARBON FILM RESISTOR 5% 0.25W AXIAL
R11		RF221DJ0	22R CARBON FILM RESISTOR 5% 0.25W AXIAL
R12		RW103XJ5	1K WW RESISTOR 5% 9W RADIAL
R13		RF274DJ0	27K CARBON FILM RESISTOR 5% 0.25W AXIAL
R14		RF102DJ0	100R CARBON FILM RESISTOR 5% 0.25W AXIAL
R15		RO150LJ0	1R5 METAL OXIDE RESISTOR 5% 2W AXIAL
R16		RW103VJ5	1K WW RESISTOR 5% 7W RADIAL
R17		RG336GJ0	⚠ 3M3 METAL GLAZE RESISTOR VDE/BS415 APPROVED 5% 0.5W AXIAL
R21		RF392DJ0	390R CARBON FILM RESISTOR 5% 0.25W AXIAL
R22		RF682DJ0	680R CARBON FILM RESISTOR 5% 0.25W AXIAL
R23		RF473DJ0	4K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
R24		RF224DJ0	22K CARBON FILM RESISTOR 5% 0.25W AXIAL
R25		RO470LJ0	4R7 METAL OXIDE RESISTOR 5% 2W AXIAL
R26		RL470GJ0	⚠ 4R7 FUSIBLE METAL RESISTOR 5% 0.5W AXIAL
R27		RF125DJ0	120K CARBON FILM RESISTOR 5% 0.25W AXIAL
R29		RF185DJ0	180K CARBON FILM RESISTOR 5% 0.25W AXIAL
R101		RF103DJ0	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R102-107		RF152DJ0	150R CARBON FILM RESISTOR 5% 0.25W AXIAL
R108		RF474DJ0	47K CARBON FILM RESISTOR 5% 0.25W AXIAL
R110		RF474DJ0	47K CARBON FILM RESISTOR 5% 0.25W AXIAL
VR111		KP0025A05	PLUG 5-WAY 20/3445
R112/113		RF103DJ0	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R114-116		RF472DJ0	470R CARBON FILM RESISTOR 5% 0.25W AXIAL
R117		RF682DJ0	680R CARBON FILM RESISTOR 5% 0.25W AXIAL
R118		RF222DJ0	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R120-123		RF153DJ0	1K5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R124		RF472DJ0	470R CARBON FILM RESISTOR 5% 0.25W AXIAL
R125		RF153DJ0	1K5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R126		RF103DJ0	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R127/128		RF222DJ0	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R130		RF222DJ0	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R131-133		RF102DJ0	100R CARBON FILM RESISTOR 5% 0.25W AXIAL
VR134		RQ103AL2	1K PRESET POT CARBON MIN 20% 0.1W H.MTG
R135/136		RF103DJ0	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R137		RF105DJ0	100K CARBON FILM RESISTOR 5% 0.25W AXIAL
R140		RF474DJ0	47K CARBON FILM RESISTOR 5% 0.25W AXIAL
R201		RF273DJ0	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
R202		RF223DJ0	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R203		RF686DJ0	6M8 CARBON FILM RESISTOR 5% 0.25W AXIAL
R204		RF156DJ0	1M5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R205		RF226DJ0	2M2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R206		RF394GJ0	39K CARBON FILM RESISTOR 5% 0.25W AXIAL
R207		RF103DJ0	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R208		RF101DJ0	10R CARBON FILM RESISTOR 5% 0.25W AXIAL
R210		RF825DJ0	820K CARBON FILM RESISTOR 5% 0.25W AXIAL
R211		RF123DJ0	1K2 CARBON FILM RESISTOR 5% 0.25W AXIAL

COMPONENTS PARTS LIST - SECTION 1

COMP. REF.	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R212		RF363DJ0	3K6 CARBON FILM RESISTOR 5% 0.25W AXIAL
R213		RF105DJ0	100K CARBON FILM RESISTOR 5% 0.25W AXIAL
R214		RF225GJ0	220K CARBON FILM RESISTOR 5% 0.25W AXIAL
R215		RF913DJ0	9K1 CARBON FILM RESISTOR 5% 0.25W AXIAL
R216		RF824DJ0	82K CARBON FILM RESISTOR 5% 0.25W AXIAL
R217		RF224DJ0	22K CARBON FILM RESISTOR 5% 0.25W AXIAL
VR218		RQ224AL1	22K PRESET POT CARBON MIN 20% 0.1W V.MTG
VR220		RQ225AL1	220K PRESET POT CARBON MIN 20% 0.1W V.MTG
R221		RF225DJ0	220K CARBON FILM RESISTOR 5% 0.25W AXIAL
R222		RF155DJ0	150K CARBON FILM RESISTOR 5% 0.25W AXIAL
R223/224		RF222DJ0	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R225		RW333LJ5	3K3 WW RESISTOR 5% 2W (PLUG)
R226		RX223PJ0	⚠ 2K2 FUSIBLE WW RESISTOR 5% 2W RADIAL
R227		RO100JJ0	1RO METAL OXIDE RESISTOR 5% 1W AXIAL
R228-230		RW682PJ0	680R WW RESISTOR 5% 4W AXIAL
R231		RX151SJ6	⚠ 15R FUSIBLE WW RESISTOR 5% 2W8 RADIAL
R232		RO101LJ0	10R METAL OXIDE RESISTOR 5% 2W AXIAL
R233/234		RF394GJ0	39K CARBON FILM RESISTOR 5% 0.5W AXIAL
R235		RL101GJ0	⚠ 10R FUSIBLE METAL RESISTOR 5% 0.5W AXIAL
R236		RM155LJ0	150K M/FILM RESISTOR 5% 2W
R301		RF685DJ0	680K CARBON FILM RESISTOR 5% 0.25W AXIAL
R302		RF124DJ0	12K CARBON FILM RESISTOR 5% 0.25W AXIAL
R303/304		RF475DJ0	470K CARBON FILM RESISTOR 5% 0.25W AXIAL
R305		RF685DJ0	680K CARBON FILM RESISTOR 5% 0.25W AXIAL
VR306		RQ475AL1	470K PRESET POT CARBON MIN 20% 0.1W V.MTG
VR307		RQ105AL1	100K PRESET POT CARBON MIN 20% 0.1W V.MTG
R308		RF155DJ0	150K CARBON FILM RESISTOR 5% 0.25W AXIAL
R310		RF183DJ0	1K8 CARBON FILM RESISTOR 5% 0.25W AXIAL
R311		RF563DJ0	5K6 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR312		RQ105AL1	100K PRESET POT CARBON MIN 20% 0.1W V.MTG
R313/314		RF474DJ0	47K CARBON FILM RESISTOR 5% 0.25W AXIAL
R315		RF225DJ0	220K CARBON FILM RESISTOR 5% 0.25W AXIAL
R316		RF184DJ0	18K CARBON FILM RESISTOR 5% 0.25W AXIAL
R317		RF563DJ0	5K6 CARBON FILM RESISTOR 5% 0.25W AXIAL
R318		RF184DJ0	18K CARBON FILM RESISTOR 5% 0.25W AXIAL
R320		RF330DJ0	3R3 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR321		RS103PL2	1K PRESET POT CARB. MIN WW/H.MTG 20% 4W
R322		RF332JJ0	330R CARBON FILM RESISTOR 5% 1W AXIAL
R323		RF100DJ0	1RO CARBON FILM RESISTOR 5% 0.25W AXIAL
R324		RF103DJ0	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R327		RF331DJ0	33R CARBON FILM RESISTOR 5% 0.25W AXIAL
C1		CX225NL6	⚠ 220nF 250V AC MET POLY CLASS X CAP 20% RADIAL
C2/3		CY103NL6	⚠ 1000pF 250V AC CERAMIC DISC CAPACITOR CLASS Y 20% RADIAL
C4			⚠ 220nF 250V AC MET POLY CLASS X CAP 20% RADIAL
C5		CD472YL6	470pF 2KV CERAMIC CAPACITOR 10% RADIAL
C6		CM104TL6	10nF 630V MET POLY CAPACITOR 20% RADIAL
C7		CD472YL6	470pF 2KV CERAMIC CAPACITOR 10% RADIAL
C8		CM104TL6	10nF 630V MET POLY CAPACITOR 20% RADIAL
C10		RF224GJ0	22K CARBON FILM RESISTOR 5% 0.25W AXIAL
C11		CA108RL7	100µF 400V ALUM ELECT CAPACITOR 20% RADIAL
C11		CA288QM7	220µF 385V ALUM ELECT CAPACITOR - 20+50% RADIAL
C12		CA476JL7	4.7µF 50V ALUM ELECT CAPACITOR 20% RADIAL
C13/14		CM105RK6	0.1µF 400V MET POLY CAPACITOR 10% RADIAL

COMPONENTS PARTS LIST - SECTION 1

COMP. REF.	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
C15		CD473KK6	4700pF 100V CERAMIC CAPACITOR 20% RADIAL
C16		CR104MK0	10nF 160V POLYSTYRENE CAPACITOR 10% AXIAL
C17		CL223XJ6	⚠ 2200pF 2000V POLYPROPYLENE CAPACITOR 5% RADIAL
C18		CA1068L0	1µF 63V ALUM ELECT CAPACITOR 20% AXIAL
C20		CY103NL6	⚠ 1000pF 250V AC CERAMIC DISC CAPACITOR CLASS Y 20% RADIAL
C22		CC223KK6	2.2µF 100V CERAMIC CAPACITOR 20% RADIAL
C23		CA476JL7	4.7µF 50V ALUM ELECT CAPACITOR 20% RADIAL
C24		CM105NK6	100nF 250V MET POLY CAPACITOR 10% RADIAL
C25		CD472SK7	470pF 500V CERAMIC CAPACITOR 20% RADIAL
C26-28		CA477NM7	47µF 250V ALUM ELECT CAPACITOR - 20+50% RADIAL
C30		CD472SK7	470pF 500V CERAMIC CAPACITOR 20% RADIAL
C31		CA478FM7	470µF 25V ALUM ELECT CAPACITOR - 20+50% RADIAL
C32/33		CM105NK6	100nF 250V POLY CAPACITOR 10% RADIAL
C34		CA228FM7	220µF 25V ALUM ELECT CAPACITOR - 20+50% RADIAL
C101/102		CA107JL7	10µF 50V ALUM ELECT CAPACITOR 20% RADIAL
C103/104		CM105NK6	100nF 250V POLY CAPACITOR 10% RADIAL
C105		CA107JL7	10µF 50V ALUM ELECT CAPACITOR 20% RADIAL
C106		CM225KK6	0.22µF 100V MET POLY CAPACITOR 20% RADIAL
C201/202		CD102KK6	100pF 100V CERAMIC CAPACITOR 10% RADIAL
C203		CM475KL6	470nF 100V MET POLY CAPACITOR 20% RADIAL
C204		CM225KK6	0.22µF 100V MET POLY CAPACITOR 20% RADIAL
C205		CM105NK6	100nF 250V MET POLY CAPACITOR 10% RADIAL
C206		CA1068L0	1µF 63V ALUM ELECT CAPACITOR 20% AXIAL
C207		CA476JL7	4.7µF 50V ALUM ELECT CAPACITOR 20% RADIAL
C208		CM104TL6	10nF 630V MET POLY CAPACITOR 20% RADIAL
C210		CJ473JJ0	4700pF 50V POLYSTYRENE CAPACITOR 5% AXIAL
C211		CM105NK6	100nF 250V POLY CAPACITOR 10% RADIAL
C212		CA228FM7	220µF 25V ALUM ELECT CAPACITOR - 20+50% RADIAL
C213		CM474NK6	47nF 250V MET POLY CAPACITOR 20% RADIAL
C214/215		CM105NK6	100nF 250V MET POLY CAPACITOR 10% RADIAL
C216/217		CD104YP7	10nF 2KV CERAMIC CAPACITOR - 20+80% RADIAL
C218		CL335NK6	⚠0.33µF 250V POLYPROPYLENE CAP 10% RADIAL
C220		CM104TL6	10µF 630V MET POLY CAPACITOR 20% RADIAL
C221		CM475RL6	470nF 400V MET POLY CAPACITOR 20% RADIAL
C222		CL753XJ6	⚠ 7500pF 1500V POLYPROPYLENE CAP 5% RADIAL
C223		CL684XK6	68nF 1500V POLY CAPACITOR 20% RADIAL
C224		CA109JL7	1000µF 50V ALUM ELECT CAPACITOR 20% RADIAL
C301		CM225KK6	0.22µF 100V MET POLY CAPACITOR 20% RADIAL
C302		CM105NK6	100nF 250V POLY CAPACITOR 10% RADIAL
C303		CM155KK6	150nF 100V MET POLY CAPACITOR 20% RADIAL
C304		CA108HL7	100µF 35V ALUM ELECT CAPACITOR 20% RADIAL
C305/306		CM105NK6	100nF 250V POLY CAPACITOR 10% RADIAL
C307		CD122SL6	120pF 500V CERAMIC CAPACITOR 10% RADIAL
C308		CA107JL7	10µF 50V ALUM ELECT CAP 20% RADIAL
C310		CM105NK6	100nF 250V POLY CAPACITOR 10% RADIAL
C311		CA478HM7	470µF 35V ALUM ELECT CAP - 20+50% RADIAL
D1-4		DP4007UU0	POWER RECTIFIER DIODE IN4007 MOTOROLA AXIAL
D5		WL6300TU1	ZEROHM SHORT CIRCUIT LINK
D6		DF0157UU0	FAST RECOVERY DIODE BA157 MOTOROLA AXIAL
D7		DF0096UU0	FAST RECOVERY DIODE BYV96E MOTOROLA AXIAL
D8, 10-14		DS4148UU0	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D15/16		DP4007UU0	POWER RECTIFIER DIODE IN4007 MOTOROLA AXIAL

COMP. REF.	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
D17		DF0159UU0	FAST RECOVERY DIODE BA159 MOTOROLA AXIAL
D18		DZ88750FB0	ZENER DIODE BZY88B7V5 400mW 2% AXIAL
D20		DZ79331FB0	ZENER DIODE BZX79B33V 400m W 2% AXIAL
D21		DP4007UU0	POWER RECTIFIER DIODE IN4007 MOTOROLA AXIAL
D22		DF0159UU0	FAST RECOVERY DIODE BA159 MOTOROLA AXIAL
D23		DF0096UU0	FAST RECOVERY DIODE BYV96E MOTOROLA AXIAL
D24		DF0157UU0	FAST RECOVERY DIODE BA157 MOTOROLA AXIAL
D25, 116		DP4007UU0	POWER RECTIFIER DIODE IN4007 MOTOROLA AXIAL
D101-107		DS4148UU0	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D108, 110, 111		DZ79560EB0	ZENER DIODE BZX79B5V6 400mW 2% AXIAL
D117		DZ79121FB0	ZENER DIODE BZX79B12V 400mW 2% AXIAL
D118		DZ79560FB0	ZENER DIODE BZX79B5V6 400mW 2% AXIAL
D201		DF0157UU0	FAST RECOVERY DIODE BA157 MOTOROLA AXIAL
D301		DS4148UU0	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D302		DP4007UU0	POWER RECTIFIER DIODE IN4007 MOTOROLA AXIAL
F1/F2 T 2A, F3 1A		KS0003YO1	FUSEHOLDER L222/K
HARNESS		WA0021AO3	TB - NO. 1 (4 LEADS) BR, OR, W,Y.
HARNESS		WA0020AO3	TB - NO. 2 (8 LEADS)
IC1		IV7812MX3	VOLTAGE REGULATOR 1C 78M12
HEATSINK		A00136IO1	HEATSINK (LCCD) ASSEMBLY
IC1 (HEATSINK)		HH0003HA0	HEATSINK 1 STAVER TYPE V6-2L
IC101		IT74136MU2	OR/TTL LOGIC SN74LS136N
IC102		IV7805LU0	VOLTAGE REGULATOR IC "!" 78L05
IC201		IL1180PU2	LINEAR BI-POLAR IC TDA 1180P PLASTIC DIL S.G.S.
IC301		IL1170SU2	LINEAR BI-POLAR IC TDA 1170S PLASTIC DIL S.G.S.
IC301 (HEATSINK)		HH0001HC0	HEATSINK STAVER V8-800
L2		LW104UA7	CHOKE WIRE ENDED 10µH PC5640
L201		LW154SK2	CHOKE WIRE ENDED 15µH B78108-T1153-K
L202		LV001UA5	COIL WIDTH PC3398
L203		LN002UA6	COIL LINE LINEARITY PC5580
L204		LW104UA7	CHOKE WIRE ENDED 10µH PC5640
LK1-17		WL6300TU1	ZEROHM SHORT CIRCUIT LINK
LK23		WL2214TU1	WIRE LINK 5mm x 14mm x 5mm
PL1		KP0300DO6	6-PIN INCLINE PLUG PCB MTG SHROUDED LOCKABLE, PRESSAC 320/3766
PL2		KP0025AO3	PLUG 3-WAY 20/3443
PL3		KP0300DO5	5 2-PIN INLINE PLUG MTG SHROUDED LOCKABLE, PRESSAC 320/3765
PL101		KP0026AI0	10-PIN INLINE PLUG PCB MTG SHROUDED PRESSAC 20/3450
PL103		KP0025AI0	10-PIN INLINE PLUG PCB MTG UNSHROUDED PRESSAC 20/3430
PL201		KP0300DO8	8-PIN INLINE PLUG PCB MTG UNSHROUDED LOCKABLE, PRESSAC 320/3768
T1A/1B		LM0001UA1	CHOKE (OREGA) 88545-00
T2		TI0004IO6	TRANSFORMER SWITCH MODE ISOLATING PC5287 OR PC5307
T201		TI0009IO1	TRANSFORMER LINE DRIVER PC4163
T203		TI1000710 1	⚠ TRANSFORMER LINE OUTPUT 14" PC3755
TH1		RT005QN0	THERMISTOR 263100P2332T333
TH2		RT003NN0	THERMISTOR 15 OHMS 30% K231
TL101		KP0024AO3	3-WAY PLUG 20/3423
TL102A/B		KM3070YO1	PIN TEST 10/3070 PRESSAC
TL106		KP0024AO3	3-WAY PLUG 20/3423
TL201A/B		KM3070YO1	PIN TEST 10/3070 PRESSAC

COMPONENTS PARTS LIST - SECTION 1

COMP. REF.	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TL202-2		WL2210TU1	WIRE LINK 5mm x 14mm x 5mm
TR1		QS0307UU5	PNP SILICON TRANSISTOR BC307-5 MOTOROLA
TR2		QP0753UX0	NPN TRANSISTOR TIPL 753A (R3213)
HEATSINK		A00007I03	HEATSINK (SMPSU) ASSEMBLY
TR2		M00205I02	HEATSINK RED POINT TV92
HEATSINK		A00008I02	HEATSINK (LOPT) ASSEMBLY
TR101		QS0337UT0	NPN SILICON TRANSISTOR BC 337-5 MOTOROLA
TR102		QS4123UU0	NPN SILICON TRANSISTOR 2N4123 MOTOROLA
TR103-105		QS4125UU5	PNP SILICON TRANSISTOR 2N4125 MOTOROLA
TR106		QS0337UT0	NPN SILICON TRANSISTOR BC337-5 MOTOROLA
TR201		QS0001UU0	NPN SILICON TRANSISTOR BF819A, BF858A, BF859A
TR202		QS0208UU0	NPN SILICON POWER TRANSISTOR BU208A
TR202 HEATSINK		M00205I02	HEATSINK RED POINT TV-92
TY1		QY0102UU0	THYRISTOR 30-100V 0.8A FAST
TY2 FIT REVERSED		QY0102DC0	THYRISTOR X0102DA
PCB		BC0029I11	MAIN PCB ASSEMBLY SERIES 3
CHAS GND		KM0006Y01	PIN TURRET 10/006 PRESSAC
AV LINK		KM3070Y01	PIN TEST 10/3070 PRESSAC

TUBE BASE ASSEMBLY AO3092IO1

COMP. REF.	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R901		RF103DJ0	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R902		RF223DJ0	2K2 PRESET POT CARB MIN H MTG 20% 0.1W AXIAL
VR903		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R904		RO154LJ0	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R905		RF273DJ0	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR906		RQ223AL2	2K2 PRESET POT CARB MIN H MTG 20% 0.1W
R907		RL102DJ0	⚠ 100R FUSIBLE METAL FILM RESISTOR 5% 0.25W AXIAL
R908		RF223DJ0	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR910		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R911		RF474JJ0	47K CARBON FILM RESISTOR 5% 1W AXIAL
R912		RO154LJ0	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R913		RF273DJ0	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR914		RO223AL2	2K2 PRESET POT CARB MIN H MTG 20% 0.1W
R915		RF223DJ0	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR916		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R917		RF474JJ0	47K CARBON FILM RESISTOR 5% 1W AXIAL
R918		RO154LJ0	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R920		RF273DJ0	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR921		RQ223AL2	2K2 PRESET POT CARB MIN H MTG 20% 0.1W
R922		RL102DJ0	⚠ 100R FUSIBLE METAL FILM RESISTOR 5% 0.25W AXIAL
R923		RF472DJ0	470R CARBON FILM RESISTOR 5% 0.25W AXIAL
R924-926		RK222GK0	220R CARBON COMP RESISTOR 10% 0.5W AXIAL
R927		RK105GK0	100K CARBON COMP RESISTOR 10% 0.5W AXIAL
R928		RF475DJ0	470K CARBON FILM RESISTOR 5% 0.25W AXIAL
R931		RK825GK0	820K CARBON COMP RESISTOR 10% 0.5W AXIAL
VR932		RQ226DL2	2M2 PRESET POT CARBON H MTG 20% 0.25W
R933		RF155LJ0	150K M/FILM RESISTOR 5% 2W AXIAL
R934		RF225LJ0	220K M/FILM RESISTOR 5% 2W AXIAL
R935		RF474JJ0	47K CARBON FILM RESISTOR 5% 1W AXIAL
R936		RL102DJ0	⚠ 100R FUSIBLE METAL RESISTOR 5% 0.25W AXIAL
R937		RF273DJ0	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
C901		CM105NK6	100nF 250V METAL POLYESTER CAPACITOR 10% RADIAL
C902,904,906		CK271JJ0	27pF 50V CERAMIC CAPACITOR
C903,905,907		CK122JJ0	120pF CERAMIC CAPACITOR 5%
C910/911		CD104YP7	10nF 2KV CERAMIC CAPACITOR - 20+80% RADIAL
C911ADJ		KM0006YO1	PIN TURRET 10/006 PRESSAC
C913		CM105NK6	100nF METAL POLYESTER CAPACITOR 10% RADIAL
D901-906, D908		DS4148UU0	SMALL SIGNAL DIODE IN4148
D907		DZ88750FB0	DIODE BZY88B7V5
L901		LW154SK2	CHOKE 15µH B78108-T1153-K
L924-926		KM3070YO1	PIN TEST 10/3070 PRESSAC
TL901		KL4838ZO2	TEST LINK 10/4838 PRESSAC
TL901		QS0042UU0	NPN SILICON TRANSISTOR MPSA42
TR901,903,905		QS0869UA0	NPN SILICON TRANSISTOR BF869
TR902,904,906		QS4123UU0	NPN SILICON TRANSISTOR 2N4123
TR907		BC0008IO7	TUBE BASE STD & MED RESOLUTION
PCB			

PARTS LISTING SERIES 3, EARLIER MODELS AND VARIANTS

For identification of parts refer to the diagrams at the end of this section.

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R1		RK105GKO	100K CARBON COMP. RESISTOR 10% 0.5W AXIAL
R2		RF185JJO	180K CARBON FILM RESISTOR 5% 1W AXIAL
R3		RF393DJO	3K9 CARBON FILM RESISTOR 5% 0.25W AXIAL
R3	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1449/AS)	RF273DJO	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
R3	(1496/LI2U)		
	(1486/LI2U)	RF363DJO	3K6 CARBON FILM RESISTOR 5% 0.25W AXIAL
R3	(1241/AS)		
	(1446/LI2)		
	(1451/MQ3)	RF473DJO	4K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
R3	(1446/LF)	RF333DJO	3K3 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR4		RQ103AL2	1K PRESET POT CARB. MIN. H MTG 20% 0.1W AXIAL
R5		RF104DJO	10K CARBON FILM RESISTOR 5% 0.25W AXIAL
R5	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1449/AS)	RF683DJO	6K8 CARBON FILM RESISTOR 5% 0.25W AXIAL
R5	(1486/LI2U)	RF823DJO	8K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R6		RW154XJ6	15K WW RESISTOR 5% 7W RADIAL
R7		RF471DJO	47R CARBON FILM RESISTOR 5% 0.25W AXIAL
R8		RF333JJO	3K3 CARBON FILM RESISTOR 5% 1W AXIAL
R8	(1496/LI2U)		
	(1486/LI2U)	RF224GJO	22K CARBON FILM RESISTOR 5% 0.5W AXIAL
R8	(1451/AS)	RF564GJO	56K CARBON FILM RESISTOR 5% 0.5W AXIAL
R10		RF392DJO	390R CARBON FILM RESISTOR 5% 0.25W AXIAL
R11		RF221DJO	22R CARBON FILM RESISTOR 5% 0.25W AXIAL
R12		RW103XJ5	1K WW RESISTOR 5% 9W RADIAL
R12	(1451AP/DS)		
	(1451/DS)	RW103VJ5	1K WW RESISTOR 5% 7W RADIAL
R13		RF274DJO	27K CARBON FILM RESISTOR 5% 0.25W AXIAL
R14		RF102DJO	100R CARBON FILM RESISTOR 5% 0.25W AXIAL
R15		R0150LJO	1R5 METAL OXIDE RESISTOR 5% 2W AXIAL
R16		RW472ZJ5	470R RESISTOR 5% 11W RADIAL
R16	(1496/LI2U)		
	(1486/LI2U)	RW103XJ5	1K WW RESISTOR 5% 9W RADIAL
R16	(1451/AS)	RW333RJO	3K3 WW RESISTOR 5% 5W RADIAL
R16	(1451AP/DS)		
	(1431/DS)		
	(1451/DS)	RW103VJ5	1K WW RESISTOR 5% 7W RADIAL
R17		RG336GJO	⚠ 3M3 METAL GLAZE RESISTOR VDE/BS415 APPROVED 5% 0.5W AXIAL
R18/20		RF394GJO	39K CARBON FILM RESISTOR 5% 0.5 AXIAL
R21		RF392DJO	390R CARBON FILM RESISTOR 5% 0.25W AXIAL
R22		RF682DJO	680R CARBON FILM RESISTOR 5% 0.25W AXIAL
R23		RF104DJO	10K CARBON FILM RESISTOR 5% 0.25W AXIAL
R23	(1441/AL)	RF683DJO	6K8 CARBON FILM RESISTOR 5% 0.25W AXIAL
R24		RF224DJO	22K CARBON FILM RESISTOR 5% 0.25W AXIAL
R25		R0470LJO	4R7 METAL OXIDE RESISTOR 5% 2W AXIAL
R26		RL470GJO	⚠ 4R7 FUSIBLE METAL RESISTOR 5% 0.5W AXIAL
R27		RF125DJO	120K CARBON FILM RESISTOR 5% 0.25W AXIAL
R29		RF185DJO	180K CARBON FILM RESISTOR 5% 0.25W AXIAL
R29	(1486/LI2U)	RF684DJO	68K CARBON FILM RESISTOR 5% 0.25W AXIAL
R30		WL2214TU1	LINK 5mm x 14mm x 5mm

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R32	(1431AP/MS)		
	(1431AP/DS)		
	(1451AP/DS)		
	(2040/CS5)	RF392DJO	390R CARBON FILM RESISTOR 5% 0.25W AXIAL
R101		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R102-107		RF152DJO	150R CARBON FILM RESISTOR 5% 0.25W AXIAL
R108		RF474DJO	47K CARBON FILM RESISTOR 5% 0.25W AXIAL
R110		RF474DJO	47K CARBON FILM RESISTOR 5% 0.25W AXIAL
VR111		KP0025A05	PLUG 5-WAY 20/3445
VR111	(1451/AS)		
	(1441/AS)		
	(1241/AS)	RQ104CL1	10K PRESET POT CARB MIN 20% 0.15W V.MTG
VR111	(1439/AS)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1435/MS)		
	(1439/MS)	KP0026A08	PLUG 8-WAY PRESSAC 2S/20/3448/BDFH
R112/113		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R114-116		RF472DJO	470R CARBON FILM RESISTOR 5% 0.25W AXIAL
R117		RF682DJO	680R CARBON FILM RESISTOR 5% 0.25W AXIAL
R118		RF222DJO	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R120-123		RF153DJO	1K5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R124		RF472DJO	470R CARBON FILM RESISTOR 5% 0.25W AXIAL
R125		RF153DJO	1K5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R126		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R127/128		RF222DJO	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R130		RF222DJO	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R131-133		RF102DJO	100R CARBON FILM RESISTOR 5% 0.25W AXIAL
VR134		RQ103AL2	1K PRESET POT CARBON MIN 20% 0.1W H.MTG
R135/R136		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R137		RF185DJO	180K CARBON FILM RESISTOR 5% 0.25W AXIAL
R138		RF105DJO	100K CARBON FILM RESISTOR 5% 0.25W AXIAL
R138	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1496/LI2U)		
	(1486/LI2U)		
	(1451/AS)		
	(1451/MS)		
	(1451/DS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	RF185DJO	180K CARBON FILM RESISTOR 5% 0.25W AXIAL
R140		RF474DJO	47K CARBON FILM RESISTOR 5% 0.25W AXIAL
R201		RF273DJO	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
R202		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R203		RF686DJO	6M8 CARBON FILM RESISTOR 5% 0.25W AXIAL
R204		RF156DJO	1M5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R205		RF226DJO	2M2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R206		RF394GJO	39K CARBON FILM RESISTOR 5% 0.25W AXIAL
R207		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R208		RF101DJO	10R CARBON FILM RESISTOR 5% 0.25W AXIAL

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R210		RF825DJO	820K CARBON FILM RESISTOR 5% 0.25W AXIAL
R211		RF123DJO	1K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R212		RF363DJO	3K6 CARBON FILM RESISTOR 5% 0.25W AXIAL
R213		RF105DJO	100K CARBON FILM RESISTOR 5% 0.25W AXIAL
R214		RF225GJO	220K CARBON FILM RESISTOR 5% 0.5W AXIAL
R215		RF104DJO	10K CARBON FILM RESISTOR 5% 0.25W AXIAL
R215	(1441/AL)	RF913DJO	9K1 CARBON FILM RESISTOR 5% 0.25W AXIAL
R216		RF824DJO	82K CARBON FILM RESISTOR 5% 0.25W AXIAL
R217		RF224DJO	22K CARBON FILM RESISTOR 5% 0.25W AXIAL
VR218		RQ224AL1	22K PRESET POT CARBON MIN 20% 0.1W V.MTG
VR220		RQ225AL1	220K PRESET POT CARBON MIN 20% 0.1W V.MTG
R221		RF225DJO	220K CARBON FILM RESISTOR 5% 0.25W AXIAL
R222		RF155DJO	150K CARBON FILM RESISTOR 5% 0.25W AXIAL
R223/224		RF222DJO	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R225		RW333LJ5	3K3 WW RESISTOR 5% 2W (PLUG)
R226		RX223PJO	⚠ 2K2 FUSIBLE WW RESISTOR 5% 2W RADIAL
R227		RF100JJO	1RO CARBON FILM RESISTOR 5% 1W AXIAL
R227	(1496/LI2U) (1431/DS) (1439/AS) (1439/MS) (2030/CS5) (2031/CS5) (2031/AX) (2032/AM) (1486/LI2U) (1451/MS) (1451/DS) (1456/LI2) (1241/AS) (1241/AT)	R0100JJO	1RO METAL OXIDE RESISTOR 5% 1W AXIAL
R228/230		RW682PJO	680R WW RESISTOR 5% 4W AXIAL
R231		RX1518J6	⚠ 15R FUSIBLE WW RESISTOR 5% 2W8 RADIAL
R232		R0101LJO	10R METAL OXIDE RESISTOR 5% 2W AXIAL
R233/234		RF394GJO	39K CARBON FILM RESISTOR 5% 0.5W AXIAL
R235		RL101GJO	⚠ 10R FUSIBLE METAL RESISTOR 5% 0.5W AXIAL
R236		RF155JJO	150K CARBON FILM RESISTOR 5% 1W AXIAL
R237	(2030/CS5) (2031/CS5) (2031/AX) (2032/AM)	RW220PJO	2R2 WW RESISTOR 5% 4W AXIAL
R301		RF685DJO	680K CARBON FILM RESISTOR 5% 0.25W AXIAL
R302		RF124DJO	12K CARBON FILM RESISTOR 5% 0.25W AXIAL
R303/304		RF475DJO	470K CARBON FILM RESISTOR 5% 0.25W AXIAL
R305		RF685DJO	680K CARBON FILM RESISTOR 5% 0.25W AXIAL
VR306		RQ475AL1	470K PRESET POT CARBON MIN 20% 0.1W V.MTG
VR307		RQ105AL1	100K PRESET POT CARBON MIN 20% 0.1W V.MTG
R308		RF155DJO	150K CARBON FILM RESISTOR 5% 0.25W AXIAL
R310		RF183DJO	1K8 CARBON FILM RESISTOR 5% 0.25W AXIAL
R311		RF563DJO	5K6 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR312		RQ105AL1	100K PRESET POT CARBON MIN 20% 0.1W V.MTG
R313/314		RF474DJO	47K CARBON FILM RESISTOR 5% 0.25W AXIAL
R314	(1241/AS)	RF155DJO	150K CARBON FILM RESISTOR 5% 0.25W AXIAL
R314	(1441/AL)	RF334DJO	33K CARBON FILM RESISTOR 5% 0.25W AXIAL
R315		RF225DJO	220K CARBON FILM RESISTOR 5% 0.25W AXIAL
R316		RF184DJO	18K CARBON FILM RESISTOR 5% 0.25W AXIAL
R316	(1241/AS)	RF394DJO	39K CARBON FILM RESISTOR 5% 0.25W AXIAL

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R317		RF563DJO	5K6 CARBON FILM RESISTOR 5% 0.25W AXIAL
R317	(1241/AS)	RF154DJO	15K CARBON FILM RESISTOR 5% 0.25W AXIAL
R318		RF184DJO	18K CARBON FILM RESISTOR 5% 0.25W AXIAL
R318	(1241/AS)	RF274DJO	27K CARBON FILM RESISTOR 5% 0.25W AXIAL
R320		RF330DJO	3R3 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR321		RS103PL2	1K PRESET POT CARB MIN WW/H.MTG 20% 4W
R322		RF332JJO	330R CARBON FILM RESISTOR 5% 1W AXIAL
R323		RF100DJO	1R0 CARBON FILM RESISTOR 5% 0.25W AXIAL
R323	(1441/AL)	RF333DJO	3R3 CARBON FILM RESISTOR 5% 0.25W AXIAL
R324		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R325		RF182JJO	180R CARBON FILM RESISTOR 5% 1W AXIAL
R326		RF152GJO	150R CARBON FILM RESISTOR 5% 0.5W AXIAL
R327		RF331DJO	33R CARBON FILM RESISTOR 5% 0.25W AXIAL
VR328		RQ222AL2	220R PRESET POT CARB MIN 20% 0.1W H.MTG
R801		R0154LJO	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R802		RL102GJO	⚠ 100R FUSIBLE METAL FILM RESISTOR 5% 0.25W AXIAL
R803/804		RF224GJO	22K CARBON FILM RESISTOR 5% 0.5W AXIAL
R805		RF183DJO	1K8 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR806		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R807		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR808		RQ473AL2	4K7 CARBON POT CARB MIN MTG 20% 0.1W
R809		RF331DJO	33R CARBON FILM RESISTOR 5% 0.25W AXIAL
R810		RF103DJO	10K CARBON FILM RESISTOR 5% 0.25W AXIAL
R811		RF472DJO	470R CARBON FILM RESISTOR 5% 0.25W AXIAL
R811	(1441)		
	(1442)	RF331DJO	33R CARBON FILM RESISTOR 5% 0.25W AXIAL
R812		R0154LJO	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R813		RL102GJO	⚠ 100R FUSIBLE METAL FILM RESISTOR 5% 0.25W AXIAL
R814/815		RF224GJO	22K CARBON FILM RESISTOR 5% 0.5W AXIAL
R816		RF183DJO	1K8 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR817		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R818		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R819		RF331DJO	33R CARBON FILM RESISTOR 5% 0.25W AXIAL
VR820		RQ473AL2	4K7 PRESET POT CARB MIN H MTG 20% 0.1W
R821		R0154LJO	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R822		RL103GJO	⚠ 1K FUSIBLE METAL FILM RESISTOR 5% 0.25W AXIAL
R822	(1441/AL)		
	(1441/AS)		
	(1441/MS		
	(1442 ALL MODELS)		
	(1241/AS)	RL102GJO	⚠ 100R FUSIBLE METAL FILM RESISTOR 5% 0.25W AXIAL
R823/824		RF224GJO	22K CARBON FILM RESISTOR 5% 0.5W AXIAL
R825		RF183DJO	1K8 CARBON FILM RESISTOR 5% 0.5W AXIAL
VR826		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R827		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR828		RQ473AL2	4K7 PRESET POT CARB MIN H MTG 20% 0.1W
R829		RF331DJO	33R CARBON FILM RESISTOR 5% 0.25W AXIAL
R830/831/832			
833		RK222GKO	220R CARBON COMP RESISTOR 10% 0.5W AXIAL
R833	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1442 ALL MODELS)		
	(1486/LI2U)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)	RK105GKO	100K CARBON COMP RESISTOR 10% 0.5W AXIAL

COMPONENTS PARTS LIST - SECTION 2

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R834		RF273DJO	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
R835		RF475DJO	470K CARBON FILM RESISTOR 5% 0.25W AXIAL
R836		RK825GKO	820K CARBON COMP RESISTOR 10% 0.5W AXIAL
VR837		RQ226CL2	2M2 PRESET POT CARB H MTG 20% 0.15W
R838		RF185JJO	180K CARBON FILM RESISTOR 5% 1W AXIAL
R840		RF155JJO	150K CARBON FILM RESISTOR 5% 1W AXIAL
VR901		RQ103AL1	1K PRESET POT CARB MIN H MTG 20% 0.1W AXIAL
R901		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R902		RF223DJO	2K2 PRESET POT CARB MIN H MTG 20% 0.1W AXIAL
VR902		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR903		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R904		R0154LJO	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R905		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR906		RQ473AL2	4K7 PRESET POT CARB MIN H MTG 20% 0.1W
R907		RL102GJO	⚠ 100R FUSIBLE METAL FILM RESISTOR 5% 0.5W AXIAL
R908		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR910		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R911		RF474JJO	47K CARBON FILM RESISTOR 5% 1W AXIAL
R912		R0154LJO	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R913		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR914		RQ473AL2	4K7 PRESET POT CARB MIN H MTG 20% 0.1W
R915		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR916		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R917		RF474JJO	47K CARBON FILM RESISTOR 5% 1W AXIAL
R918		R0154LJO	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R920		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR921		RQ473AL2	4K7 PRESET POT CARB MIN H MTG 20% 0.1W
R922		RL102GJO	⚠ 100R FUSIBLE METAL FILM RESISTOR 5% 0.5W AXIAL
R923		RF472DJO	470R CARBON FILM RESISTOR 5% 0.25W AXIAL
R924-926		RK222GKO	220R CARBON COMP RESISTOR 10% 0.5W AXIAL
R927		RK105GKO	100K CARBON COMP RESISTOR 10% 0.5W AXIAL
R928		RF475DJO	470K CARBON FILM RESISTOR 5% 0.25W AXIAL
R931		RK825GKO	820K CARBON COMP RESISTOR 10% 0.5W AXIAL
VR932		RQ226CL2	2M2 PRESET POT CARBON H MTG 20% 0.15W
R933		RF155JJO	150K CARBON FILM RESISTOR 5% 1W AXIAL
R933		RF185JJO	180K CARBON FILM RESISTOR 5% 1W AXIAL
R934		RF185JJO	180K CARBON FILM RESISTOR 5% 1W AXIAL
R934		RF225JJO	220K CARBON FILM RESISTOR 5% 1W AXIAL
R935		RF474JJO	47K CARBON FILM RESISTOR 5% 1W AXIAL
R936		RL102GJO	⚠ 100R FUSIBLE METAL RESISTOR 5% 0.5W AXIAL
R937		RF273DJO	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
C1		CX225NL6	⚠ 220nF 250V AC MET POLY CLASS X CAP 20% RADIAL
C2/3		CY103NL6	⚠ 1000pF 250V AC CERAMIC DISC CAPACITOR CLASS Y 20% RADIAL
C4			AS C1
C5		CD472YL6	470pF 2KV CERAMIC CAPACITOR 20% RADIAL
C6		CM104TL6	10nF 630V MET POLY CAPACITOR 20% RADIAL
C7		CD472YL6	470pF 2KV CERAMIC CAPACITOR 20% RADIAL
C8			AS C6
C10		CM564RK6	56nF 400V POLY CAPACITOR 20% RADIAL
C10	(1496/LI2U)		
	(1486/LI2U)	CM105NL6	100nF POLY CAPACITOR 20% RADIAL
C11		CA108RM7	100uF 385V ALUM ELECT CAPACITOR - 20+50% RADIAL
C11		CA288QM7	220uF 385V ALUM ELECT CAPACITOR - 20+50% RADIAL
C12		CA476HM6	4.7uF 35V ALUM ELECT CAPACITOR - 20+50% RADIAL
C13/14		CM105RL6	100nF 400V MET POLY CAPACITOR 20% RADIAL
C15		CD473KK6	4700pF 100V CERAMIC CAPACITOR 20% RADIAL

COMPONENTS PARTS LIST - SECTION 2

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
C16		CR104MKO	10nF 160V POLYSTYRENE CAPACITOR 2.5% AXIAL
C17		CL223XJ6	⚠ 2200pF 2000V POLYPROPYLENE CAPACITOR 5% RADIAL
C18		CA106JLO	1uF 50V ALUM ELECT CAPACITOR 20% AXIAL
C20		CY103NL6	⚠ 1000pF 250V AC CERAMIC DISC CAPACITOR CLASS Y 20% RADIAL
C21		CM105RL6	100nF 400V POLY CAPACITOR 20% RADIAL
C22		CD223FL6	2200pF 25V CERAMIC CAPACITOR 20% RADIAL
C23		CA476HM6	4.7uF 35V ALUM ELECT CAPACITOR - 20+50% RADIAL
C24		CM105NL6	100nF 250V MET POLY CAPACITOR 20% RADIAL
C25		CD472RL6	470pF 400V CERAMIC CAPACITOR 20% RADIAL
C26-28		CA477NM6	47uF 250V ALUM ELECT CAPACITOR - 20+50% RADIAL
C30		CD472RL6	470pF 400V CERAMIC CAPACITOR 20% RADIAL
C31		CA478FM6	470uF 25V ALUM ELECT CAPACITOR - 20+50% RADIAL
C32,33		CM105ML6	100nF 160V POLY CAPACITOR 20% RADIAL
C34		CA228FM6	220uF 25V ALUM ELECT CAPACITOR - 20+50% RADIAL
C101, 102		CA107FM6	10uF ALUM ELECT CAPACITOR - 2+50% RADIAL
C103, 104		CM105ML6	100nF 160V POLY CAPACITOR 20% RADIAL
C105			AS C101
C106		CM225KL6	220nF 100V MET POLY CAPACITOR 20% RADIAL
C201/202		CD102FL6	100pF 25V CERAMIC CAPACITOR 20% RADIAL
C203		CM475KL6	470nF 100V MET POLY CAPACITOR 20% RADIAL
C204		CM225KL6	220nF 100V MET POLY CAPACITOR 20% RADIAL
C205		CM105ML6	100nF 160V MET POLY CAPACITOR 20% RADIAL
C206		CA685JLO	680nF 50V ALUM ELECT CAPACITOR 20% AXIAL
C207		CA476HM6	4.7uF 35V ALUM ELECT CAPACITOR - 20+50% RADIAL
C208		CM104TL6	10nF 630V MET POLY CAPACITOR 20% RADIAL
C210		CP473GGO	4700pF 30V POLYSTYRENE CAPACITOR 2.5% AXIAL
C211		CM105ML6	100nF 160V POLY CAPACITOR 20% RADIAL
C212		CA228FM6	220uF 25V ALUM ELECT CAPACITOR - 20+50% RADIAL
C213		CM474NK6	47nF 250V MET POLY CAPACITOR 20% RADIAL
C214/215		CM105NL6	100nF 250V MET POLY CAPACITOR 20% RADIAL
C216/217		CD104YL6	10nF 2KV CERAMIC CAPACITOR 20% RADIAL
C218		CL335KN6	⚠ 0.33uF 250V POLYPROPYLENE CAP 10% RADIAL
C220		CM104TL6	10uF 630V MET POLY CAPACITOR 20% RADIAL
C221		CM475RL6	470nF 400V MET POLY CAPACITOR 20% RADIAL
C222		CL753XJ6	⚠ 7500pF 1500V POLYPROPYLENE CAP 5% RADIAL
C222	(ALL 1441, 1442 MODELS)		
	(1446/LF)		
	(1446/LI2)		
	(1451/MQ3)	CL563YJ6	5600pF 2000V POLYPROPYLENE CAP 5% RADIAL
C222	(1241/AS)	CL333XJ6	3n3 2000V POLYPROPYLENE CAP 5% RADIAL
C222	(1241/AT)	CL473YJ6	4700pF 2000V POLYPROPYLENE CAP 5% RADIAL
C223		CM684XK6	68nF 1500V POLY CAPACITOR 20% RADIAL
C224		CA109IN7	1000uF 40V ALUM ELECT CAPACITOR - 20+50% RADIAL
C225		CD561RL6	56pF 400V CERAMIC CAPACITOR 20% RADIAL
C301		CM225KL6	220nF 100V MET POLY CAPACITOR 20% RADIAL
C302		CM105NK6	100nF 250V POLY CAPACITOR 20% RADIAL
C303		CM155KK6	150nF 100V MET POLY CAPACITOR 20% RADIAL
C304		CA108HM6	100uF 35V ALUM ELECT CAPACITOR - 20+50% RADIAL
C305/306			AS C302
C306	(1241/AS)		
	(1241/AT)	CM225KL6	220nF 100V MET POLY CAPACITOR 20% RADIAL
C307		CD122RL6	120pF 400V CERAMIC CAPACITOR 20% RADIAL
C308		CA107FM6	10uF 25V ALUM ELECT CAP - 20+50% RADIAL
C310		CM105NK6	100nF 250V POLY CAPACITOR 20% RADIAL
C311		CA478HM6	470uF 35V ALUM ELECT CAP - 20+50% RADIAL
C312		CA228FM6	220uF 25V ALUM ELECT CAP - 20+50% RADIAL

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
C801		CM105NL6	100nF 250V METAL POLYESTER CAPACITOR 20% RADIAL
C802/804/806		CP271GGO	27pF 30V POLYSTYRENE CAPACITOR 2.5% AXIAL
C803/805/807		CP561GGO	56pF 30V POLYSTYRENE CAPACITOR 2.5% AXIAL
C808		CD104YL6	10nF 2KV CERAMIC CAPACITOR 20% RADIAL
C810		CM105NL6	100nF 250V METAL POLYESTER CAPACITOR 20% RADIAL
C811		CD104YL6	10nF 1-2KV CERAMIC CAPACITOR 20% RADIAL
C901		CM105NL6	100nF 250V METAL POLYESTER CAPACITOR 20% RADIAL
C902,904,906		CP271GGO	27pF POLYSTYRENE CAPACITOR 2.5% AXIAL
C903,905,907		CP122GG1	120pF POLYSTYRENE CAPACITOR 2.5% AXIAL
C910,911		CD104YL6	10nF 2KV CERAMIC CAPACITOR 20% RADIAL
C913		CM105NL6	0.1uF 250V METAL POLYESTER CAPACITOR 20%
D1-4		DP4007UMO	POWER RECTIFIER DIODE IN4007 MOTOROLA AXIAL
D5		DP4005UMO	POWER RECTIFIER DIODE IN4005 MOTOROLA AXIAL
D6		DF0157UEO	FAST RECOVERY DIODE BA157 MOTOROLA AXIAL
D7		DF0159UEO	FAST RECOVERY DIODE BA159 MOTOROLA AXIAL
D8, 10-14		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D11-13		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D15,16		DP4002UMO	POWER RECTIFIER DIODE IN4002 MOTOROLA AXIAL
D17		DF0159UEO	FAST RECOVERY DIODE BA159 MOTOROLA AXIAL
D18		DZ88750FCO	ZENER DIODE BZY88C7V5 400mW 5% AXIAL
D20		DZ79331FCO	ZENER DIODE BZX79C33V 400mW 5% AXIAL
D21		DP4002UMO	POWER RECTIFIER DIODE IN4002 MOTOROLA AXIAL
D22		DF0159UEO	FAST RECOVERY DIODE BA159 MOTOROLA AXIAL
D23		DF0818UMO	FAST RECOVERY DIODE MR818 MOTOROLA AXIAL
D24		DF0157UEO	FAST RECOVERY DIODE BA157 MOTOROLA AXIAL
D25,116		DP4002UMO	POWER RECTIFIER DIODE IN4002 MOTOROLA AXIAL
D101-107		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D108,110,111		DZ79560FCO	ZENER DIODE BZX79C5V6 400mW 5% AXIAL
D108,110,111	(1431AP/MS4) (1431AP/DS) (1431/AS) (1432/AS) (1431/MS4) (1431/BS) (1431/LS1) (1431/MB4) (1431/MZ3) (1431/MZ4) (1431/MR4) (1435/MS) (1436/LS1) (1436/MS4) (2030/CS5) (1439/AS) (1439/MS4) (1439/MS) (1451AP/DS)		
	(1449/AS)	DZ79430FCO	ZENER DIODE BZX79C4V3 400mW 5% AXIAL
D117		DZ79121FCO	ZENER DIODE BZX79C12V 400mW 5% AXIAL
D118			AS D108
D201		DF0157UEO	FAST RECOVERY DIODE BA157 MOTOROLA AXIAL
D301		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D302		DP4005UMO	POWER RECTIFIER DIODE IN4005 MOTOROLA AXIAL
D801-803		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D804		DZ79750FC1	ZENER DIODE BZX79C75 400mW 5% AXIAL

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
D804	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1442)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	DZ88750FC0	DIODE BZY88C7V5
D805-808		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D901-906		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D907		DZ79750FC1	ZENER DIODE BZX79C7V5 400mW 5% AXIAL
D907	(1496/LI2U)		
	(1439/AS)		
	(1439/MS)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1436/LS1)		
	(1436/MS4)		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1456/LI2)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1451/DS)		
	(1451/MS4)		
	(1451/MQ3)		
	(1451/AS)	DZ88750FC0	ZENER DIODE BZY88C7V5 400mW 5% AXIAL
D908			AS D805
F1/F2		KA2001BA0	⚠ FUSE 2AMP (20mm) TIME DELAY

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COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
F2	(2031/AX)		
	(2032/AM)		
	(1431/AS)		
	(1432/AS)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1439/AS)		
	(1439/MS)		
	(1451/AS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1451/DS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1456/LI2)		
	(1241/AT)	KA2001BAO	⚠ FUSE 2AMP (20mm) TIME DELAY
F3	(2031/AX)		
	(1431/AS)		
	(1432/AS)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1451/AS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451/DS)		
	(1446/LF)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1456/LI2)		
	(1241/AS)	KA1001BQO	⚠ FUSE 1AMP (20mm) FAST BLOW
FH1 A/B	A/B	KS0001Y01	FUSE CLIP-PCB MTG (5mm)

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
FH1A/B,FH2A/B			
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1451/AS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1451/DS)		
	(1449/AS)		
	(1456/LI2)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	KS0003Y01	FUSEHOLDER L222/K
FH3A/B	(1496/LI2U)		
	(1486/LI2U)	KS0006Y01	FUSE CLIP-PCB MTG (6.3mm)

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
FH3A/B	(2031/CS5) (2031/AX) (2032/AM) (1431AP/MS4) (1431AP/DS) (1431/AS) (1432/AS) (1431/BS) (1431/LS1) (1431/MZ3) (1431/MZ4) (1431/MB4) (1431/MR4) (1431/MS4) (1431/DS) (1435/MS) (1436/LS1) (1436/MS4) (1439/AS) (1441/AL) (1441/AS) (1441/MS) (1441/MS4) (1451/AS) (1451/MS) (1451AP/MS4) (1451AP/DS) (1451/DS) (1449/AS) (1456/LI2) (1241/AS) (1446/LF) (1446/LI2) (1241/AT)	KS0001Y01	FUSE CLIP-PCB MTG (5mm)
HARNESS		A00584I01	TB - NO. 1 (4 LEADS) BR, OR, W, Y.
HARNESS		A00585I01	TB - NO. 2 (8 LEADS)
HARNESS	(2031/CS5) (1449/AS)	A00815I01	TB - NO. 1 (4 LEADS) BR, OR, W, Y.
HARNESS	2031/CS5)	A00816I01	TB - NO. 2 (8 LEADS)
HARNESS	(1441/AL)	A00104I01	TB - NO. 1 (4 LEADS)
HARNESS	(1441/AL)	A00179I01	TB - NO. 2 (8 LEADS)
IC1		IV7812MX3	VOLTAGE REGULATOR 1C 78M12
IC1 (HEATSINK)		HH0003HA0	HEATSINK 1 STAVER TYPE V6-2L
IC101		IT74136MM2	OR/TTL LOGIC SN74LS136N
IC102		IV7805LX0	VOLTAGE REGULATOR IC "I" 78L05
IC201		IL1180PS2	LINEAR BI-POLAR IC TDA 1180P PLASTIC DIL S.G.S.
IC301		IL1170SS2	LINEAR BI-POLAR IC TDA 1170S PLASTIC DIL S.G.S.
IC301 (HEATSINK)		HH0001HC0	HEATSINK STAVER V8-800
L2		LW473UA6	CHOKE WIRE ENDED 10uH PC3774

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
L2	(1496/LI2U) (2030/CS5) (2031/CS5) (2031/AX) (2032/AM) (1431AP/MS4) (1431AP/DS) (1431/AS) (1432/AS) (1431/BS) (1431/LS1) (1431/MZ3) (1431/MZ4) (1431/MB4) (1431/MR4) (1431/MS4) (1431/DS) (1435/MS) (1436/LS1) (1436/MS4) (1439/AS) (1439/MS) (1441/AL) (1441/AS) (1441/MS) (1441/MS4) (1486/LI2U) (1451/AS) (1451/DS) (1451/MS) (1451AP/MS4) (1451AP/DS) (1449/AS) (1456/LI2) (1241/AS) (1446/LF) (1446/LI2) (1241/AT)	LW104UA7	CHOKE WIRE ENDED 10uH PC5640
L201		LW154SK2	CHOKE WIRE ENDED 15uH B78108-T1153-K
L202		LV001UA5	COIL WIDTH PC3398
L203		LN002UA5	COIL LINE LINEARITY PC5580
L204		LW104UA7	CHOKE WIRE ENDED 10uH PC5640
L801-804	(1441/AL) (1441/AS) (1441/MS) (1442) (1446/LF) (1446/LI2) (1241/AT)	LW154SK2	CHOKE 15uH B78108-T1153-K
L801		LW154VA5	CHOKE WIRE ENDED 15VH PC3391
L802		LW104VA4	CHOKE WIRE ENDED 10VH PC2677
L803/804		LW104VA4	CHOKE WIRE ENDED 10VH PC2677
L901		LW154UA5	CHOKE WIRE ENDED 15uH PC3391

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
L901	(1496/LI2U)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1451/AS)		
	(1451/MS4)		
	(1451/MQ3)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1451/DS)		
	(1456/LI2)		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)	LW154SK2	CHOKE WIRE ENDED 15uH B78108-T1153-K
L924		LW154UA5	15uH (IN SERIES WITH R924)
	(1496/LI2U)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/M23)		
	(1431/M24)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1451/AS)		
	(1451/MS4)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1451/DS)		
	(1451/MQ3)		
	(1456/LI2)		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)	LW154SK2	CHOKE 15uH B78108-T1153-K

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COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
L925	(1496/LI2U) (1431AP/MS4) (1431AP/DS) (1431/AS) (1432/AS) (1431/BS) (1431/LS1) (1431/MZ3) (1431/MZ4) (1431/MB4 (1431/MR4) (1431/MS4) (1431/DS) (1435/MS) (1436/LS1) (1436/MS4) (1439/AS) (1439/MS) (1441/MS4) (1451AP/MS4) (1451/MS4) (1451/MQ3) (1451AP/DS) (1451/DS) (1456/LI2) (2030/CS5) (2031/CS5) (2031/AX)	LW154UA5	15uH (IN SERIES WITH R925)
	(2032/AM)	LW154SK2	CHOKE 15uH B78108-T1153-K
L926		LW154UA5	15uH (IN SERIES WITH R926)
L926	(1496/LI2U) (1431AP/MS4) (1431AP/DS) (1431/AS) (1432/AS) (1431/BS) (1431/LS1) (1431/MZ3) (1431/MZ4) (1431/MB4) (1431/MR4) (1431/MS4) (1431/DS) (1435/MS) (1436/LS1) (1436/MS4) (1439/AS) (1439/MS) (1441/MS4) (1451AP/MS4) (1451/MS4) (1451/MQ3) (1451AP/DS) (1451/DS) (1456/LI2) (2030/CS5) (2031/CS5) (2031/AX)		
	(2032/AM)	LW154SK2	CHOKE 15uH B78108-T1153-K

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
LK1-5,7,8 10-18,20-22		WL2214TU1	WIRE LINK 5mm x 14mm x 5mm
LK23	(2031/AX) (2032/AM) (1451/AS)		
	(1451/DS)	WL2214TU1	WIRE LINK 5mm x 14mm x 5mm
PL1		KP0220D06	6 PIN INLINE PLUG PCB MTG SHROUDED PRESSAC 220/1546
PL1	(1496/LI2U) (1431AP/MS4) (1431AP/DS) (1431/AS) (1432/AS) (1431/BS) (1431/LS1) (1431/MZ3) (1431/MZ4) (1431/MB4) (1431/MR4) (1431/MS4) (1431/DS) (1435/MS) (1436/LS1) (1436/MS4) (2030/CS5) (2031/CS5) (2031/AX) (2032/AM) (1439/AS) (1439/MS) (1441/AL) (1441/AS) (1441/MS) (1441/MS4) (1486/LI2U) (1451/AS) (1451/MS) (1451/DS) (1451AP/MS4) (1451AP/DS) (1449/AS) (1456/LI2) (1241/AS) (1446/LF) 1446/L12)		
	(1241/AT)	KP0300D06	6 PIN INLINE PLUG PCB MTG SHROUDED LOCKABLE, PRESSAC 320/3766
PL2		KP0025A03	PLUG 3 WAY 20/3443
PL3		KP0220D05	5-2 PIN INLINE PLUG MTG SHROUDED PRESSAC 220/2145-2,4

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
PL3	(1496/LI2U) (1431AP/MS4) (1431AP/DS) (1431/AS) (1432/AS) (1431/BS) (1431/LS1) (1431/MZ3) (1431/MZ4) (1431/MB4) (1431/MR4) (1431/MS4) (1431/DS) (1435/MS) (1436/LS1) (1436/MS4) (1439/AS) (1439/MS) (1441/AL) (1441/AS) (1441/MS) (1441/MS4) (2030/CS5) (2031/CS5) (2031/AX) (2032/AM) (1486/LI2U) (1451/AS) (1451/DS) (1451/MS) (1451AP/MS4) (1451AP/DS) (1449/AS) (1456/LI2) (1241/AS) (1446/LF) (1446/LI2) (1241/AT)	KP0300D05	5-2 PIN INLINE PLUG MTG SHROUDED LOCKABLE. PRESSAC 320/3765
PL101		KP0026A10	10 PIN INLINE PLUG PCB MTG SHROUDED PRESSAC 20/3450
PL102		KP0025A05	5-2 WAY INLINE PLUG PCB MTG 20/3345
PL103		KP0025A10	10 PIN INLINE PLUG PCB MTG UNSHROUDED PRESSAC 20/3430
PL103	(2030/CS5) (1431AP/MS4) (1431AP/DS) (1435/MS) (1439/AS) (1451AP/MS4) (1449/AS)	KP0026A10	10 PIN INLINE PLUG PCB MTG SHROUDED PRESSAC 20/3450
PL201		KP0222D08 OR KP0300D08	8 PIN INLINE PLUG PCB MTG UNSHROUDED PRESSAC 220/1138 8 PIN INLINE PLUG PCB MTG UNSHROUDED LOCKABLE. PRESSAC 320/3768

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
T1			LINKS 2 x 14mm
T1A/1B		LM0001UA1	CHOKE (OREGA) 88545-00
T2		TI0004I06	TRANSFORMER SWITCH MODE ISOLATING PC5287 OR PC5307
T2	(1496/LI2U)		
	(1486/LI2U)	TL002SU0	TRANSFORMER SWITCH MODE ISOLATING PC3960
T201		TI0009I01	TRANSFORMER LINE DRIVER PC4163
T202		TI0003I01	⚠ TRANSDUCTOR EAST-WEST PC3396
T203		TI0007I01	TRANSFORMER LINE OUTPUT 14" PC3755
T203	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)	TI0016I01	TRANSFORMER LINE OUTPUT 20"
TH1	(1496/LI2U)		
	(1486/LI2U)	RT002QL0	THERMISTOR PTH45LC09-BG8ROH140
TH1	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1456/LI2)		
	(1241/AT)	RT005QNO	THERMISTOR 263100P2332T333

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TH2	(1496/LI2U) (2030/CS5) (2031/CS5) (2031/AX) (2032/AM) (1439/AS) (1431AP/MS4) (1431AP/DS) (1431/AS) (1432/AS) (1431/BS) (1431/LS1) (1431/MZ3) (1431/MZ4) (1431/MB4) (1431/MR4) (1431/MS4) (1431/DS) (1435/MS) (1436/LS1) (1436/MS4) (1441/AL) (1441/AS) (1441/MS) (1441/MS4) (1486/LI2U) (1451/AS) (1451/DS) (1451/MS) (1451AP/MS4) (1451AP/DS) (1449/AS) (1241/AS) (1446/LF) (1446/LI2) (1456/LI2) (1241/AT)	RT003NNO	THERMISTOR 15 OHMS 30% K231

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TL101-106	(2030/CS5) (2031/AX) (2032/AM) (1431AP/MS4) (1431/AS) (1432/AS) (1431/BS) (1431/LS1) (1431/MZ3) (1431/MZ4) (1431/MB4) (1431/MR4) (1431/MS4) (1431/DS) (1435/MS) (1436/LS1) (1436/MS4) (1439/AS) (1441/AL) (1441/AS) (1441/MS) (1441/MS4) (1486/LI2U) (1451/AS) (1451/DS) (1451/MS) (1451AP/MS4) (1451AP/DS) (1449/AS) (1456/LI2) (1241/AS) (1446/LF) (1446/LI2) (1241/AT)	KP0024A03	3-WAY PLUG 20/3423

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TL101,103-106			
	(2031/AX)		
	(2032/AM)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1486/LI2U)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1456/LI2)		
	(1241/AT)	KS7859I02	SOCKET-SHORTING 7859-02
TL102			
	(1486/LI2U)		
	(1435/MS)		
	(1446/LI2)	KL4838Z02	TEST LINK 10/4838 PRESSAC

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TL102A/B, 201A/B	(2030/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1456/LI2)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	KM3070Y01	PIN TEST 10/3070 PRESSAC

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TL201	(2031/CS5)		
	(2032/AM)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1486/LI2U)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1456/LI2)		
	(1241/AT)	KL4838Z02	LINK TEST 10/4838 PRESSAC
TL201A/B			
	(2031/CS5)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1436/LS1)		
	(1436/MS4)		
	(1441/MS4)		
	(1449/AS)	KM3070Y01	PIN TEST 10/3070 PRESSAC
TL202-2		WL2210TU1	WIRE LINK 5mm + 10mm + 5mm
TL901		KM3070Y01	PIN TEST 10/3070 PRESSAC
TL901		KL4838Z02	LINK TEST 10/4838 PRESSAC
TL901		KM0006Y01	PIN TURRET 10/006 PRESSAC
TL901A/B			
	(1435/MS)	KM3070Y01	PIN TEST 10/3070 PRESSAC.
TL901A/B			
	(1435/MS)	KL4838Z02	LINK TEST 10/4838 PRESSAC
TR1		QS0307UM5	PNP SILICON TRANSISTOR BC307-5 MOTOROLA

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TR2	(1496/LI2U) (1431AP/MS4) (1431AP/DS) (1431/AS) (1432/AS) (1431/BS) (1431/LS1) (1431/MZ3) (1431/MZ4) (1431/MB4) (1431/MR4) (1431/MS4) (1431/DS) (1435/MS) (1436/LS1) (1436/MS4) (1439/AS) (1441/AL) (1441/AS) (1441/MS) (1441/MS4) (1451/AS) (1451/DS) (1451/MS4) (1451AP/MS4) (1451/MQ3) (1451AP/DS) (1456/LI2) (2032/AM) (1486/LI2U) (1449/AS) (1241/AS) (1446/LF) (1446/LI2)	QT003AX0	NPN DARLINGTON TRANSISTOR TIPL 753A (R3213)
	(1241/AT)	QP0753UX0	NPN TRANSISTOR TIPL753A (R3213)
HEATSINK		A00007102	LCCD HEAT SINK (SMPSU) ASSEMBLY
TR2	HEATSINK	M00205I01	HEATSINK REDPOINT TV3 SPECIAL
TR16		QS0500UM0 OR	NPN SILICON POWER TRANSISTOR MOTOROLA BU500
		QS0500VX0	NPN SILICON POWER TRANSISTOR TEXAS BU500
TR16 HEAT SINK		A00008102	LCCD HEAT SINK (LOPT) ASSEMBLY
TR101		QS0337UT0	NPN SILICON TRANSISTOR BC337-5 MOTOROLA
TR102		QS4123UM0	NPN SILICON TRANSISTOR 2N4123 MOTOROLA
TR103-105		QS4125UM5	PNP SILICON TRANSISTOR 2N4125 MOTOROLA
TR106		QS0337UT0	NPN SILICON TRANSISTOR BC337-5 MOTOROLA
TR201		QS0460UM0	NPN SILICON TRANSISTOR BF460-5 MOTOROLA
TR201 HEATSINK		M00305I01	HEATSINK REDPOINT TV3 SPECIAL
TR202		QS0500UM0	NPN TRANSISTOR SIL BU500
TR202 HEATSINK		M00205I01	HEATSINK REDPOINT TV3 SPECIAL
TR301			AS TR106
TR801,804,806 901,903,905		QS0392UM0	NPN SILICON TRANSISTOR BF392 MOTOROLA
TR801-804	(1441, 1442) (1449/AS)	QS0393WT1	TRANSISTOR BF393 W1

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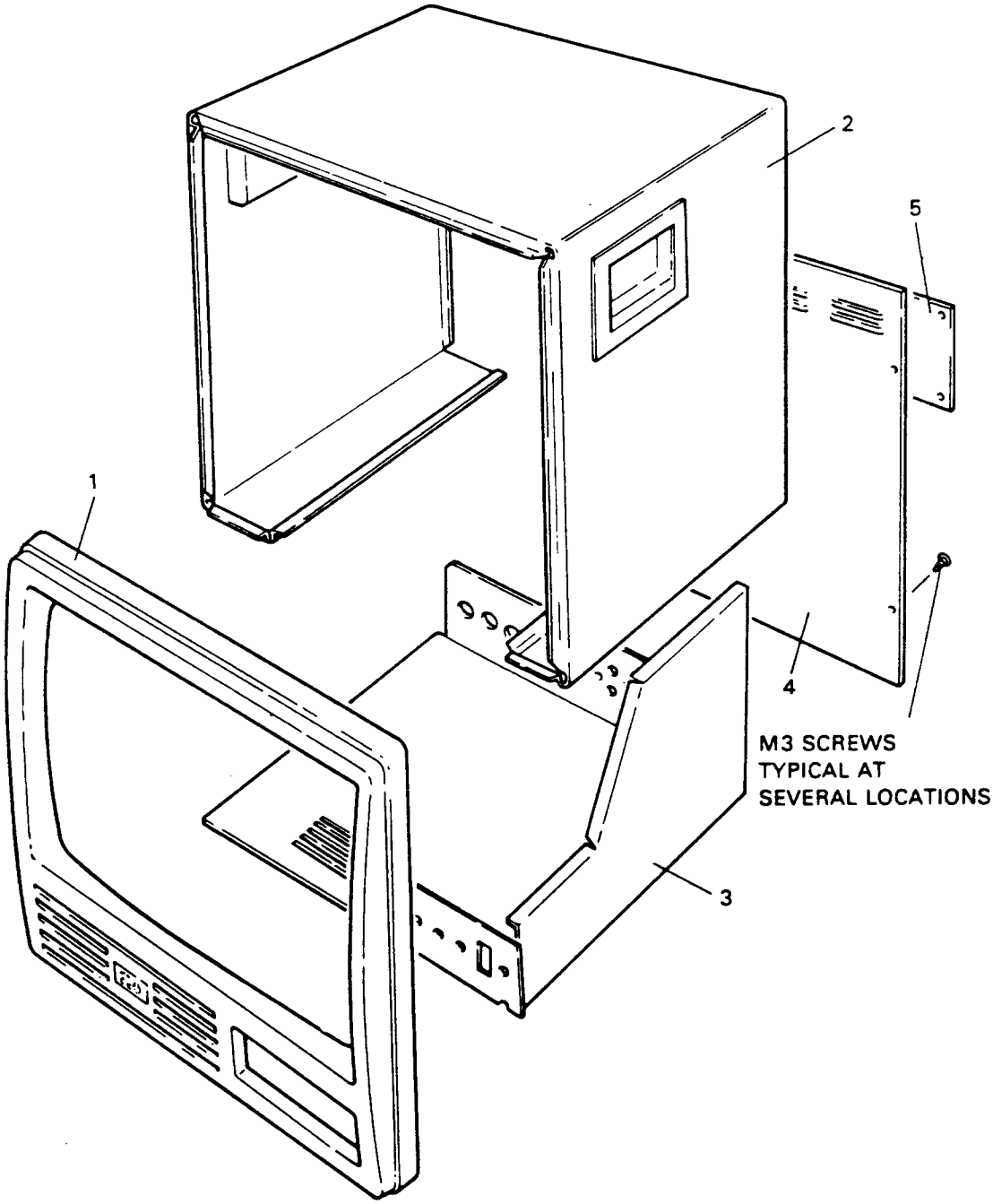
COMPONENTS PARTS LIST - SECTION 2

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TR802,805,807 902,904,906		QS0787UM1	NPN SILICON TRANSISTOR BF787-5 MOTOROLA
TR802,805,807 902,904,906	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1436/LS1)		
	(1436/MS4)		
	(1486/LI2U)		
	(1435/MS)		
	(1439/AS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	QS0869UAO	NPN SILICON TRANSISTOR BF869-5 MOTOROLA
TR802,805		QS0869UAO	*TRANSISTOR BF869
TR803,907		QS4123UMO	NPN SILICON TRANSISTOR 2N4123 MOTOROLA
TR806		QS0393WT1	*TRANSISTOR BF393 W1
TR807	(1441)		
	(1442)		
	(1241/AS)	QS0869UAO	TRANSISTOR BF869
TR902,904,906			
	(1431AP/MS4)		
	(1431AP/DS)		
	(1496/LI2U)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS4)		
	(1451AP/MS4)		
	(1451/MQ3)		
	(1451AP/DS)		
	(1456/LI2)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)	QS0869UAO	NPN SILICON TRANSISTOR BF869-5 MOTOROLA
TRIPLER		ET001QA1	TRIPLER BG1897
TY1,2		QY0103UMO	THYRISTOR BR 103 MOTOROLA AXIAL
PCB		BC0029106	MAIN PCB ASSEMBLY SERIES 3 (6)

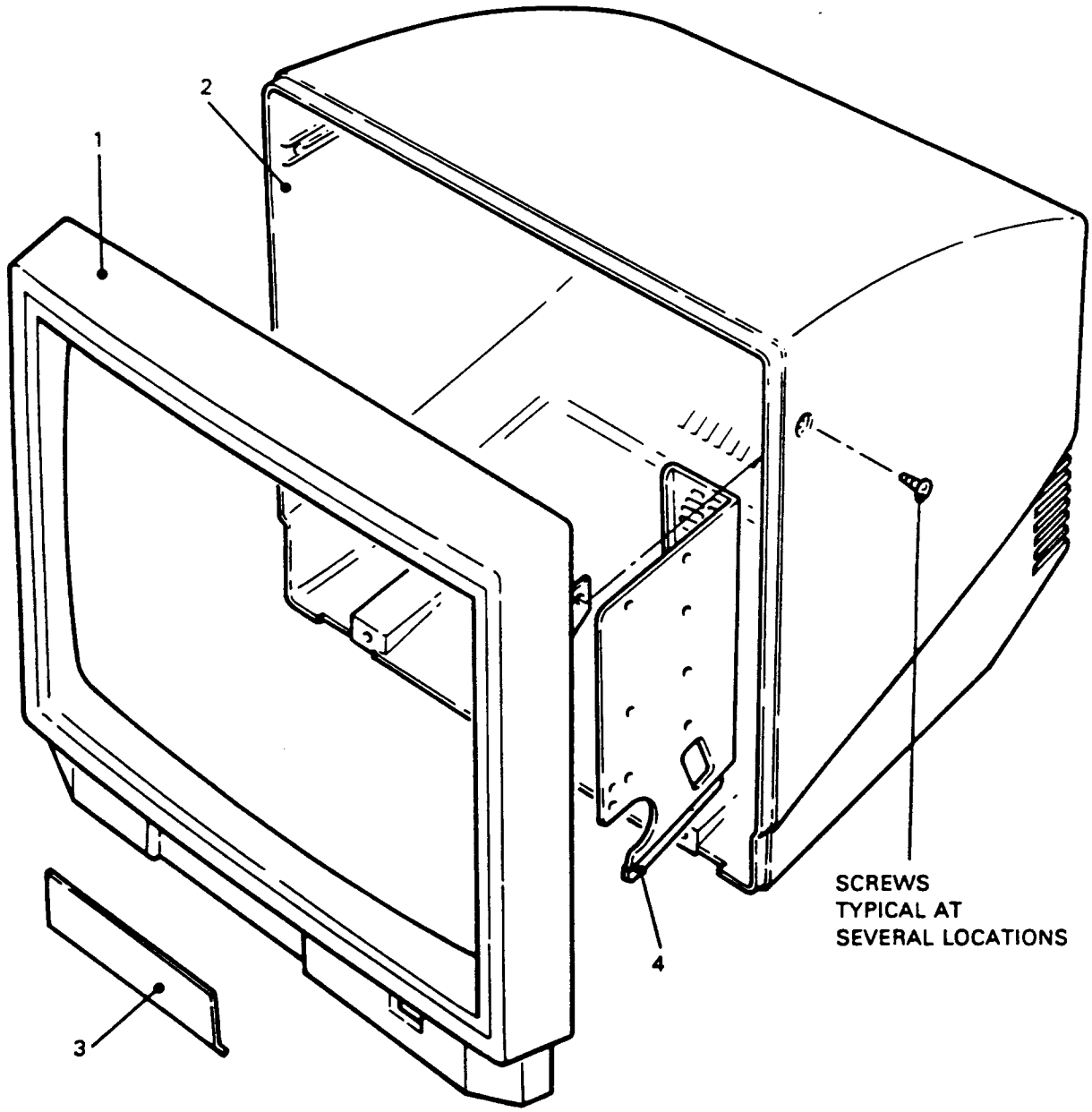


C SERIES CABINET - 20 INCH MODEL

This cabinet is an all-metal, rugged construction, incorporating carrying handles fitted on each side.

C SERIES CABINET COMPONENT PARTS

IDENT NO.	PART NO.	DESCRIPTION
1	PC0136I03	FACIA, CABINET BEZEL
2	MC0137I04	CABINET TOP/SIDE ASSEMBLY
2	MC0150I03	CABINET TOP/SIDE ASSEMBLY (INCL. SPEAKER)
3	M00235I02	CABINET BASE ASSEMBLY
4	MC0139I01	CABINET BACK ASSEMBLY
5	PC0140I01	BLISTER, FITTED TO CABINET BACK

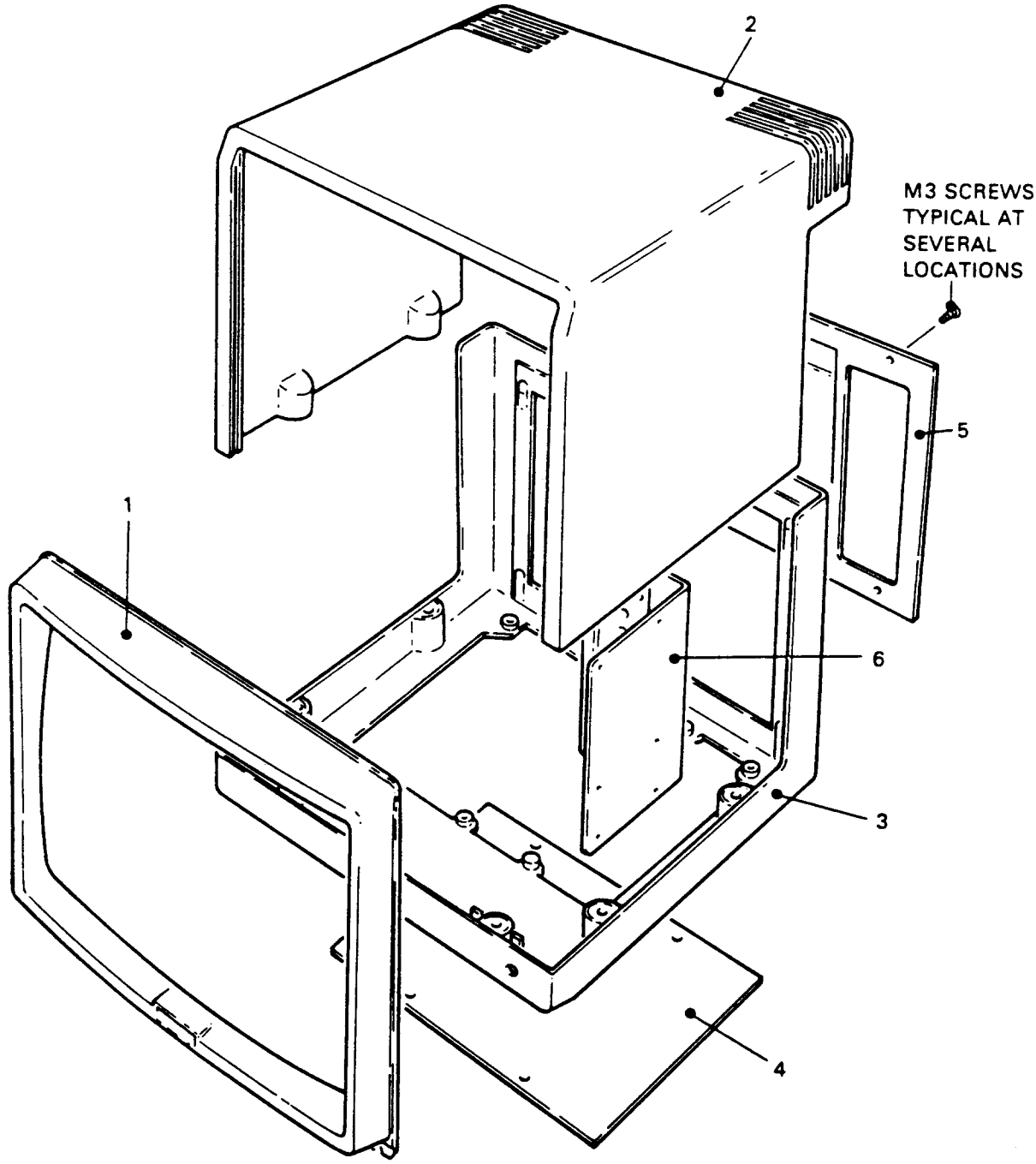


D SERIES CABINET - 14 INCH MODEL

This cabinet is injection moulded, and is one of the latest designs offered in the MICROVITEC CUB monitor range and is available in different colours.

D SERIES CABINET COMPONENT PARTS

IDENT NO.	PART NO.	DESCRIPTION
1	PC0124I01	FACIA, CABINET BEZEL
2	PC0125I01	CABINET
3	PC0126I01	HINGED DOOR
4	M00221I04	INPUT BRACKET ASSEMBLY (METAL)



L SERIES CABINET - 14 INCH MODEL

This cabinet is constructed of high density structural foam. A modern compact design, available in different colours.

L SERIES CABINET COMPONENT PARTS

IDENT NO.	PART NO.	DESCRIPTION
1	PC0103I05	FACIA, CABINET BEZEL
2	PC0104I02	CABINET TOP/SIDE ASSEMBLY
3	PC0107I02	CABINET BASE ASSEMBLY (MOULDED)
4	P00308I01	CABINET BASE PANEL (MOULDED)
5	PC0105I01	CABINET BACK ASSEMBLY
6	M00141I03	INPUT AND CONTROLS BRACKET ASSEMBLY (METAL)

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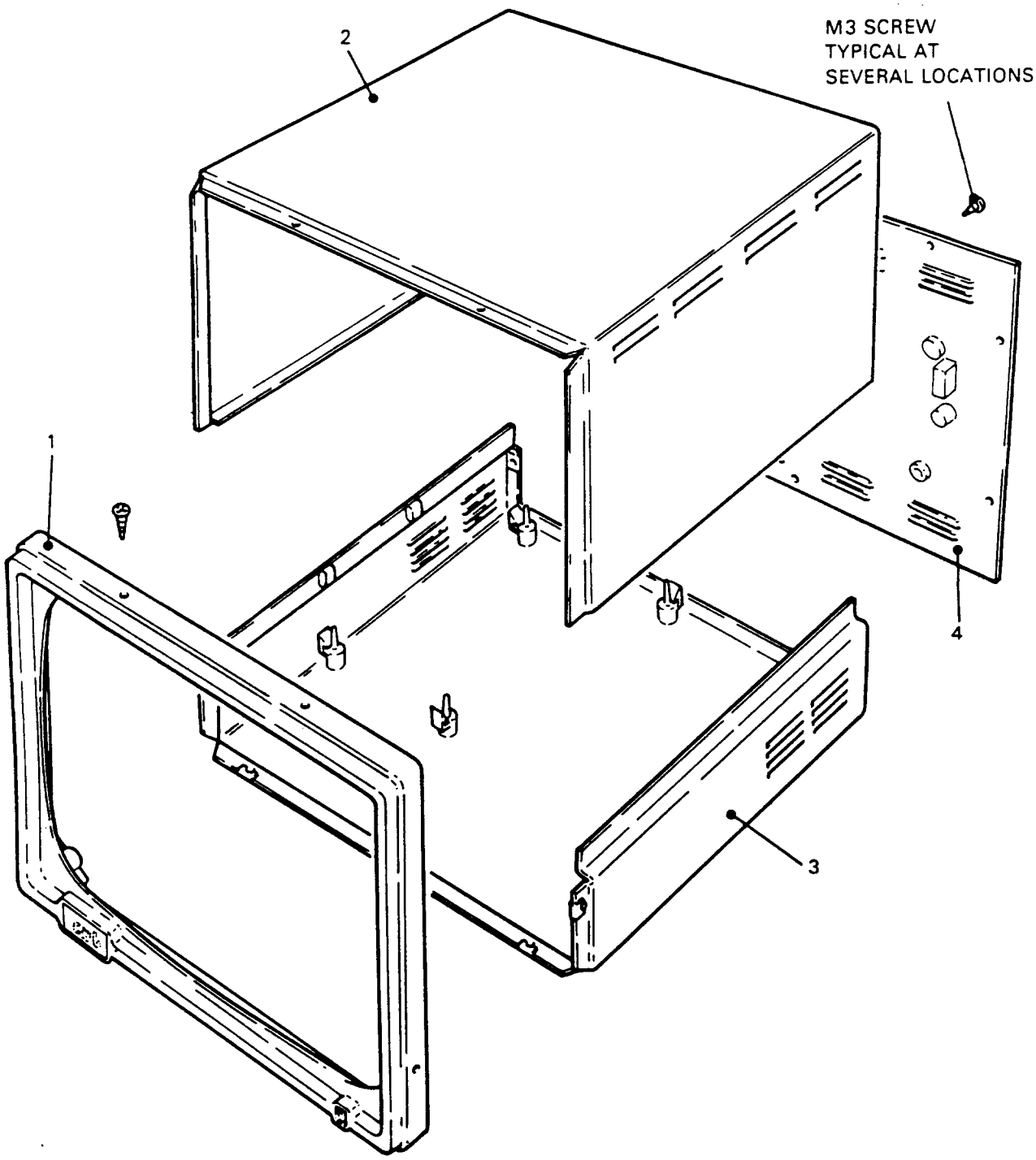
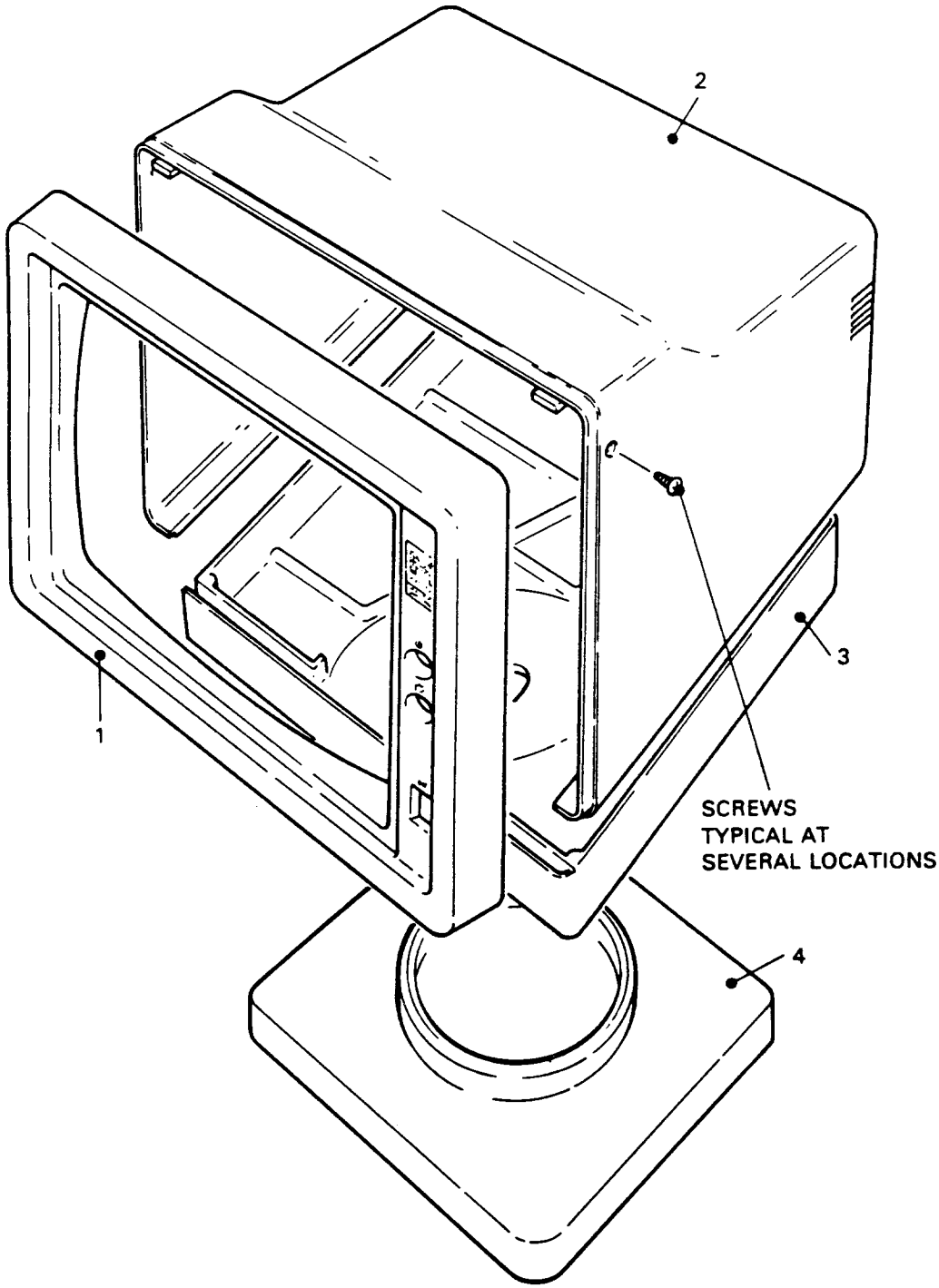


M SERIES CABINET - 14 AND 20 INCH MODEL

This cabinet is an all-metal, rugged construction. The 20 inch model was deleted from production in December 1983.

M SERIES CABINET COMPONENT PARTS

IDENT NO.	PART NO.	DESCRIPTION
1	MC0066104	FACIA, CABINET BEZEL
2	MC0021105	CABINET TOP/SIDE ASSEMBLY
3	MC0019103	CABINET BASE ASSEMBLY
4	MC0094103	CABINET BACK ASSEMBLY



T SERIES CABINET - 14 INCH MODEL

A foam polyurethane moulded cabinet incorporating a swivel base assembly.

T SERIES CABINET COMPONENT PARTS

IDENT NO.	PART NO.	DESCRIPTION
1	PC5047I02	FACIA, CABINET BEZEL MOULDING
2	PC5046I01	CABINET COVER MOULDING
3	PC5045I01	CABINET BASE MOULDING
4	PC5044I01	CABINET PLINTH MOULDING

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TRIPLE STANDARD - PAL INTERFACE

GENERAL

The 'Triple Standard - PAL Interface Assembly' is designed to interface between the Series 3 main chassis PCB assembly and the host system. It is designed to accept RS170 video signals (0.7v p-p video + 0.3v p-p mixed - Ve Sync into 75R). In wire-frame chassis format, output connections from interface to main chassis PCB are made via hard-wired flexible leads and multiway plug-in connectors PL102 and PL103, located on the main chassis.

On some models, an interface input wiring harness lead assembly is provided. This is supplied with one end only of the harness terminated in a 17-way connector, the opposite wire ends being unterminated. Circuit details and connections for this harness lead assembly are given in the accompanying diagram - '17-Way Harness Connections' and 'Table of Options'.

DOUBLE STANDARD/TRIPLE STANDARD INPUTS

Depending on how the interface assembly is installed, input modes for either double or triple standards may be accommodated as follows:

1. TTL and PAL Video Mode - Double Standard
2. TTL, 1 volt 75 ohm and PAL Video Mode - Triple Standard

1. Double Standard Input

When wired as indicated in the diagram - 'TTL' and 'PAL Video' Modes are accommodated. Either one of these two modes may be selected by a 'single pole change-over' switch as shown in the diagram.

2. Triple Standard Input

Wiring details to accommodate Triple-Standard inputs and the various input options are given in the '17-Way Harness Connections' Diagram and the accompanying 'Table of Options'. Suitable additional switching may be incorporated to accommodate the various options, depending on user requirements.

OPERATIONAL NOTES

1. PAL/Sync Input

When this input (PL1-pin 16) is used as the separate sync input of a 1v/75R R.G.B. + sync video source, the amplitude of the sync MUST BE between 0.2v p-p and 0.7v p-p, nominally 0.3v peak to peak. If the amplitude exceeds these values, an 'In-Line' B.N.C. attenuator must be used.

2. Sync-On Green Option

Setting Plug Link 'TL1' on the PAL Interface PCB to 'Position 2', allows a 'sync-on-green' 1V/75R RGB Video Source to be used.

NB: Note that the 'Green' 1V/75R video input (PL1-pin 12) now also becomes the PAL input.

See wiring diagram and 'Table of Options'.

BRIGHTNESS CONTROL LIMIT

If required - a resistor of 5K6 ohms 0.25W - may be incorporated in series with the 'brightness' control to limit the control's range of 'brightness' variation - as shown in the diagram.

AUDIO STAGE

On some versions of the interface, either single channel or twin channel audio amplifier stages may be incorporated, depending on model and specification.

Inputs and outputs for the audio stage(s) are marked as left-hand channel (L) and right-hand channel (R) and are terminated in 2-pin connectors. Normally, only a single channel audio stage is provided in most applications.

Audio input to the stage may be fed across a 47k 'gain control' pot, with the slider taken to the audio stages input.

TYPICAL AUDIO SPECIFICATIONS

Typical specifications for the audio amplifier stage are as follows:

Input impedance: 47 k nominal

Input sensitivity: 100 mV typical

Output: 2 watts max @ 1kHz into 16 ohms

TABLE OF OPTIONS				
Connector		Available Standards		
Pin No.	Wire Colour Coding	TTL	1V/75R	PAL
10	Brown	O/C	0V (S/C)	0V (S/C)
15	Mauve	*	> 0.7V < 12V (O/C)	0V (S/C)
17	Pink	0V (S/C)	> 10.5V < 12V (O/C)	> 10.5V < 12V (O/C)

NOTES:

* = Not Critical (May be 0V to 12V or O/C)

O/C = Open Circuit (No connection)

S/C = Short Circuit (< 10 R) to 0V (Ground)

PARTS LIST

Circuit Reference	Component Reference	Component Description
RESISTORS		
R5, 20, 21, 23, 25, 27, 28	RF104DJ0	RESISTOR C/F 10K ¼W 5%
R6, 8	RF562DJ0	RESISTOR C/F 560R ¼W 5%
R7, 30	RF473DJ0	RESISTOR C/F 4K7 ¼W 5%
R9	RF156DJ0	RESISTOR C/F 1M5 ¼W 5%
R10	RF183DJ0	RESISTOR C/F 1K8 ¼W 5%
R11, 12	RF392DJ0	RESISTOR C/F 390R ¼W 5%
R13, 18	RF225DJ0	RESISTOR C/F 220K ¼W 5%
R14, 15	RF123DJ0	RESISTOR C/F 1K2 ¼W 5%
R16	RF272DJ0	RESISTOR C/F 270R ¼W 5%
R17	RF273DJ0	RESISTOR C/F 2K7 ¼W 5%
R19	RF184DJ0	RESISTOR C/F 18K ¼W 5%
R22, 24, 26	RF103DJ0	RESISTOR C/F 1K0 ¼W 5%
R31	RL101DJ0	RESISTOR M/FUS, 10R ¼W 5%
R32	RF392DJ0	RESISTOR C/F 390R ¼W 5%
R33	RF152DJ0	RESISTOR C/F 150R ¼W 5%
R40	RF103DJ0	RESISTOR C/F 1K0 ¼W 5%
R101, 201	RF104DJ0	RESISTOR C/F 10K ¼W 5%
R102, 202	RF222DJ0	RESISTOR C/F 220R ¼W 5%
R103, 203	RF100DJ0	RESISTOR C/F 1R0 ¼W 5%
VR1	RQ102AL2	POT PRESET 100R 0.1W H7
CAPACITORS		
C1, 2	CA337EN6	CAPACITOR ALUM/ELEC 33µF 16V
C3	CK331JJ0	CAPACITOR CERAMIC/T 33pF 50V
C4	CK121JK0	CAPACITOR CERAMIC/T 12pF 50V
C5	CK681JJ0	CAPACITOR CERAMIC/T 68pF 50V
C6, 8-15	CK104FL0	CAPACITOR CERAMIC/T 10nF 25V 20%
C7	CM225KK6	CAPACITOR MET/T 0.22µF 100V
C16, 17, 18, 19, 20, 27	CM105NL6	CAPACITOR MET/T 0.1µF 250V
C21	CK222JK0	CAPACITOR CERAMIC/T 220pF 50V
C22	CM105NL6	CAPACITOR MET/P 0.1µF 250V
C23	CK103JK0	CAPACITOR CERAMIC/T 1nF 50V
C24	CK151JK0	CAPACITOR CER/T 15pF 50V AXIAL
C25, 26	CM4758K6	CAPACITOR MET/P 470nF 63V
C30	CA107JL7	CAPACITOR A/ELEC 10µF 50V 20% RAD PR
C31	CA105NL6	CAPACITOR CERAMIC/T 100nF
C101, 102, 201, 202	CA2268M7	CAPACITOR A/ELEC 2.2µF 63V PREF
C103, 203	CA107JL7	CAPACITOR A/ELEC 10µF 50V 20% RAD PR
C104, 204	CM225KL6	CAPACITOR MET/P 0.22µF 100V
C105, 205	CA109HM6	CAPACITOR ALUM/ELEC 1000µF 35V
C106, 206	CM105NL6	CAPACITOR MET/P 0.1µF 250V
C107, 207	CA478FM7	CAPACITOR ALUM/ELEC 470µF 25V

Circuit Reference	Component Reference	Component Description
DIODES		
D1, 2, 3	DZ79560FR0	DIODE ZENER BZX79B5V6 2%
D4, 5	DS4148UT0	DIODE IN 4148 THOMSON
INTEGRATED CIRCUITS		
IC1	IL3301UM3	CIRCUIT INT. TDA3301 SELECTED
IC2	IG4551UM2	CIRCUIT INT. 4551
IC101, IC201	IL19080S2	CIRCUIT INT. TDA 1908
CHOKES & DELAY LINES		
L1	LW474SK2	CHOKE 47μH
L2	LW105SK2	CHOKE 100μH
L3	LW104SK2	CHOKE 10μH
L4, 5	LV001TA3	CHOKE KAN K2819XM
L11	LW154SK2	CHOKE 15μH B78108-T1153-K
DL1	ED0001P01	DELAY LINE DL470
DL2	ED0002P01	DELAY LINE DL711
CONNECTORS		
PL1	KP0026A17	PLUG 17-WAY 20/3457
PL2	KP0026A16	PLUG 16-WAY 20/3456
PL102	KP0025A05	PLUG 5-WAY 20/3445
PL103	KP0025A03	PLUG 3-WAY 20/3443
PL104	KP0025A04	PLUG 4-WAY 20/3444
TL1	KP0024A03	PLUG 3-WAY 20/3423
MISCELLANEOUS		
FIT TL1	KL9005Z02	LINK TEST MOLEX 90059-0009 P/O
X1	XC0014UU6	CRYSTAL IQD TYPE 'P' A124D
2 TRACK CUTS	BC0111I02	PCB PAL INTERFACE
LK1, 2, 3	WL2214TU1	WIRE LINK 5mm x 14mm x 5mm
LK6 7, 8	WL2212TU1	WIRE LINK 5mm x 12mm x 5mm
LK9, 10	WL2214TU1	WIRE LINK 5mm x 14mm x 5mm
LK12, 13	WL2212TU1	WIRE LINK 5mm x 12mm x 5mm
	A01647101	I/FACE ASSEMBLY TPL/STD - MC REV 3

SPECTRUM INTERFACE CARD – DESCRIPTION/OPERATION

1. LUMINANCE CHANNEL (Y)

A. The (-Y) signal contains:

(1) Video information
(2) line sync pulses
(3) frame sync pulse

B. The incoming Y signal is attenuated by the potential divider, R16, R17 the resultant signal is then amplified by TR6.

C. Transistors TR7, TR8 and TR9 have the following functions:-

(1) TR7 - Seperates the sync pulses
(2) TR8 - Inverts the sync pulses
(3) TR9 - Buffers the sync pulses
R28 and R29 in the emitter of TR9, splits the voltage swing to produce a 'SYNC TTL' output.

D. The rising edge of the sync output signal is used by C6, R30 and TR24 to produce a pulse which has the same duration and timing as the colour burst gating pulse on the +/- (R-Y) signal.

E. The luminance signal on the collector of TR6, is clamped to the black level by C10 and TR25.

F. The black level is set by resistor/diode potential divider formed by VR1, (R36, R37, R65 and 2 IN4148 diodes).

2. COLOUR DIFFERENCE CHANNELS

A. The -(B-Y) Channel

(1) The -(B-Y) signal is attenuated by a potential divider network R32 and R34. TR10 inverts and amplifies to produce + (B-Y). TR11 and C9 use the sync pulses to clamp the + (B-Y) signal to the black level.
(2) TR21 merges + (B-Y) clamped signal to +Y clamped signal to produce the BLUE output.
(3) TR22, is an electronic switch that has its threshold set by R56 and R57.
(4) The gain of TR22 is set by R58 and R59 to produce TTL levels. TR23 emitter follows the TTL signal which produces a buffered output.

B. The +/- (R-Y) Channel

This channel is a phase alternating line (PAL) signal, which requires alternate lines, inverted to produce + (R-Y).

(1) The incoming +/- (R-Y) signal is A.C. coupled by C17, C1 and TR1 thus forming a unity gain, phase splitter.
(2) The non inverted output of TR1 drives an electronic switch (TR3). The inverted output of TR1 is buffered by TR2.
(3) The (R-Y) switch is enabled during the colour burst, gating pulse.
(4) A set/re-set flip-flop switch formed by IC 1C and IC 1D works in the following :-
(a) SET - If next line of video is POSITIVE
(b) RESET - If next line of video is NEGATIVE
(5) The outputs of IC1D enable bi-directional switches which will either:
(a) Connect +(R-Y) through C1
(b) Connect inverted -(R-Y) through C2.
Thus producing +(R-Y), TR4 and TR5 clamp the +(R-Y) to the black level.
(6) The + (R-Y) clamped signal is added to the +Y clamped signal by TR13 to produce +R signal.
(7) TR14 has its threshold set by R43 and R42, the gain is set by R44 and R45, in order to produce TTL levels.
(8) TR15 emitter follows the TTL signal thus producing a buffered signal output.

C. THE (G-Y) OUTPUT

(1) This signal is generated by mixing the following:-
   (a) The (B-Y) clamped signal, TR16 performs this mixing function
   (b) The (R-Y) clamped signal, TR16 performs this mixing function

(2) The proportions of (B-Y) and (R-Y) clamped signals which are added together are set by R54 and R40.

(3) G OUTPUTS
   (a) This signal is produced by the addition of the following signals:-
      (i) (G-Y) clamped signal, TR17 performs this function.
      (ii) +Y clamped signal, TR17 performs this signal function.

(4) TR18 has its threshold set by R48 and R49, the gain is thus set by, R50 and R51 in order to produce suitable TTL levels.

(5) TR19 emitter follows the TTL signal and produces a buffered output.

'PROM' INTERFACE PANEL

GENERAL

1. The 'Programmable-read-only-memory' (PROM) interface panel is used with certain models in the 'SERIES-3' range of colour monitors. Two different versions of the panel assembly may be used - depending on model and intended country of operation.

2. **Basically, the two versions are very similar.**

   (1) Versions incorporating R.F.I. filtering networks (L/C components L1 to L3 & C4 to C6), are employed with certain models intended for use in countries other than the UK.

   (2) Versions without R.F.I. filtering are currently used for models operating in the U.K.

3. **Interface connections:**

   (1) When installed, this panel assembly interfaces between input connector PL101, located on 'SERIES-3' main chassis PCB and the monitor's 'user' 7-pin Din input socket.

   NOTE: The 'customer' contrast control VR111, shown on the 'SERIES-3' main chassis circuit diagram, is not fitted as shown when the PROM interface is used. In this case, the 'customer' contrast control pot is connected to 'PL2', located on the PROM interface panel.

   (2) The 'PROM-INTERFACE CONNECTION DIAGRAM' provides wiring interconnection details.

CIRCUIT DIAGRAM

1. The circuit diagram for the 'PROM INTERFACE PANEL' provides circuit details of the panel assembly. Component values are given in the accompanying LIST of COMPONENTS.

CIRCUIT DESCRIPTION

1. The purpose of the 'PROM' interface panel is to convert 4-Bit digital video signals, normally referred to as 'R.G.B. & Intensity', into Linear R.G.B. signals.

2. **Colour Combinations**

   (1) There are 16 possible colours which can be displayed (2^4 combinations).

   (2) IC2, a fusible link PROM, provides sixteen 8-bit outputs corresponding to one of the 16 addresses selected by the R.G.B. and intensity signals.
   These outputs use 3-bits for RED and GREEN, and 2-bits for BLUE video, hence; there are 8 levels of Red and Green and 4 levels of Blue available.

   (3) Resistors R3 to R10 and resistors R11 to R18 form potential dividers respectively between base and collector resistors of TR101, TR102, TR103, located on the 'SERIES-3' main PCB. Resistors values are selected to 'weight' respective PROM outputs, to 'least significant' and 'most significant' bits.

   NOTE: When the 'PROM interface Panel' is installed, the moveable links PL103, shown in the 'SERIES-3' main circuit diagram, should be fitted into linked POSITION (1).

3. **+5 Volt Supply**

   (1) IC1, C2 and C3 provides a regulated +5V supply for IC2.

4. **Protection & Termination**

   (1) Diodes D1 to D5 provide flash-over protection for IC2 and for computer signal 'in' sources.

   (2) Reistors R21 to R26 may be fitted on some models to terminate incoming digital signals.

5. **Contrast Control**

   (1) Transfer TR1, R1 and an external pot connected to PL2 provide for 'customer' control of contrast on some models.

   (2) TR1 forms an emitter follower, the voltage at the emitter determining the video output amplitude on 'contrast'.

6. **Sync Signals**

(1) Sync signals are not required by the PROM circuitry and are passed directly through the interface panel.

7. **R.F.I. Filtering**

(1) On models requiring R.F.I. filtering, L/C networks formed by L1/C4, L2/C5 and L3/C6 are fitted on R, G & B outputs.

LIST OF COMPONENTS - PROM INTERFACE PANEL

GENERAL

1. Components used in the Prom Interface Panel Assemblies, together with possible component variations are listed following;

2. Details of possible circuit variations, used with different versions of the panel, are shown in the accompanying Prom Interface Circuit Diagram.

RESISTORS

1. Most of the resistors employed in the construction are standard carbon film types of 0.25 watt rating. ±5% tolerance.

LIST OF COMPONENTS - PROM INTERFACE

Component Reference	Part No.	Component Description
RESISTORS		
R1	RF683DJO	RESISTOR C/F 6K8 0.25W 5%
R2	RF391GJO	RESISTOR C/F 39R 0.5W
R3,6,11,14,20,21,22,23,24,25,26	RF222DJO	RESISTOR C/F 220R 0.25W 5%
R4,7,10,12	RF472DJO	RESISTOR C/F 470R 0.25W 5%
R15,18	RF103DJO	RESISTOR C/F 470R 0.25W 5%
R5,8,13	RF103DJO	RESISTOR C/F 1KO 0.25W 5%
R16	RF683DJO	RESISTOR C/F 1KO 0.25W 5%
R9,17	RF102DJO	RESISTOR C/F 100R 0.25W 5%
R19		RESISTOR C/F 2K2 0.25W 5%
NOTE FOR APPLE MONITORS ONLY; - RESISTOR C/F R9,R17 BECOMES 220R 0.25W 5%		
CAPACITORS		
C1	CA2268M6	CAPACITOR ALUM/ELEC 2.2UF 63V
C2,3	CM105ML6	CAPACITOR MET/P 0.1UF 160V
C4,5,6	CK151JKO	CAPACITOR CER/T 15PF 50V
DIODES, TRANSISTORS, INTEGRATED CIRCUITS		
TR1	QS0337UTO	TRANSISTOR BC337-5
IC1	IV7805LXO	CIRCUIT INT. 78L05
IC2	IR18030AX2	PROM TBP 18SA030N (PROGRAMMED INDIVIDUALLY FOR SPECIFIC MODEL)
D1,2-5	DS4148UTO	DIODE IN4148 THOMPSON
CONNECTORS		
PL1,3	KP0026A10	PLUG 10 PIN 20/3450 PRES
PL2	KP0025A05	PLUG 5 WAY 20/3445
INDUCTORS		
L1,2,3	LW104SK2	CHOKE 10 UH

MODIFICATION FOR IBM/APPLE INTERFACES

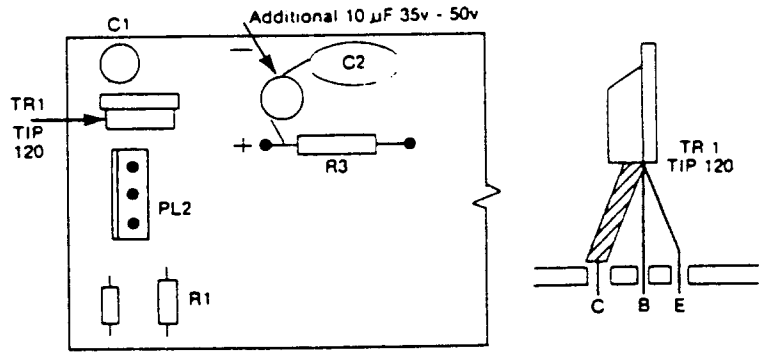
(1) Remove TR1 (BC337) and replace with TIP 120 as shown.

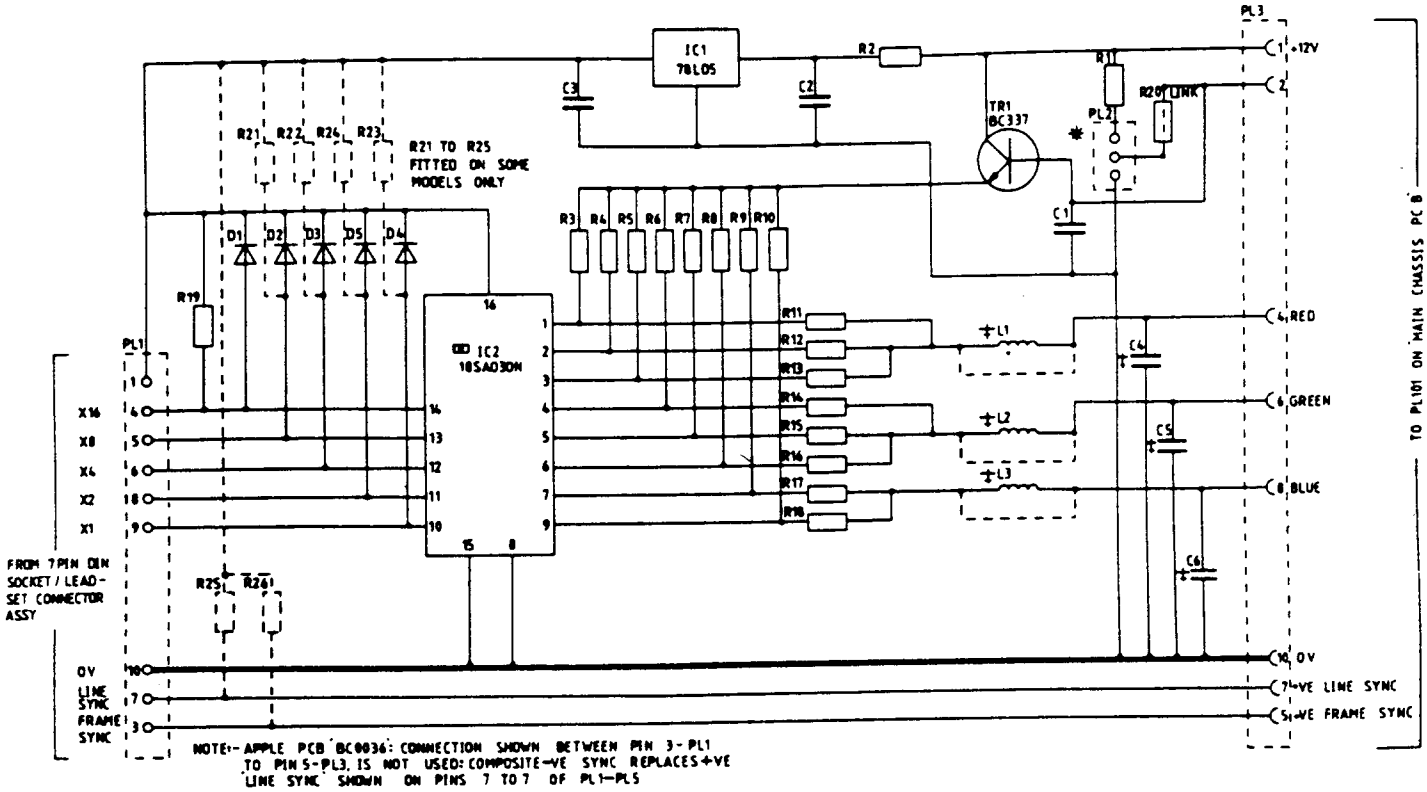
(2) Remove R1 (6 K8) and replace with 8K2 ¼ watt 5%.

(3) Place a 10 microfarad 35V electrolytic as follows:

(i) negative side, to top of existing C4 position

(ii) positive side, mechanically wrapped around and soldered to left side of R3.

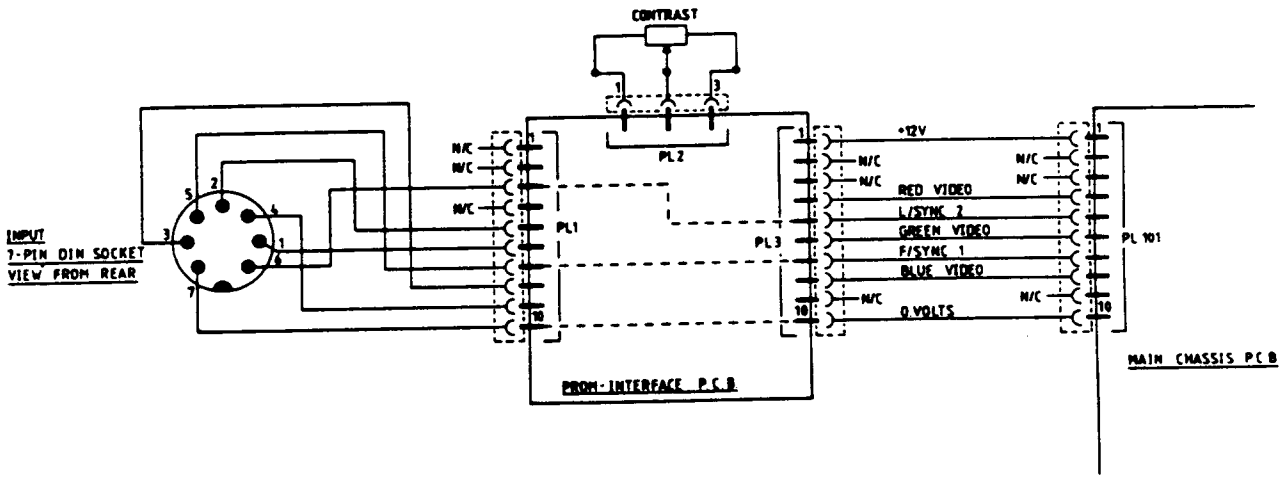


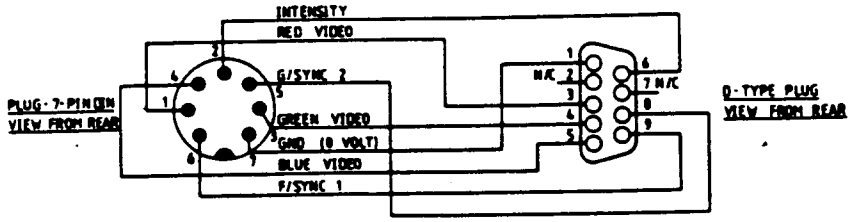


NOTE:- APPLE PCB 'BC0036': CONNECTION SHOWN BETWEEN PIN 3 - PL1 TO PIN 5 - PL3, IS NOT USED: COMPOSITE -VE SYNC REPLACES +VE 'LINE SYNC' SHOWN ON PINS 7 TO 7 OF PL1 - PL5

SYMBOL	REMARKS
⊡	IC2 IS PROGRAMMED INDIVIDUALLY FOR SPECIFIC MONITOR MODEL Nº
✱	PL2 CONNECTS TO CUSTOMER CONTRAST CONTROL POT ASSY
⏚	FITTED ON RFI SUPPRESSED VERSIONS ONLY

CIRCUIT DIAGRAM 'PROM INTERFACE PANEL'





PROM INTERFACE - INTERCONNECTION DIAGRAM - FOR SERIES 3 MONITORS
DRG Nº G00737

SERVICE SUPPLEMENT

CUB 3000

AND

SERIES 3 MODELS WITH SUFFIX 'C'

GP0237AA0

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Series 3C Drive/Deflection Circuit Diagram - G00397

Tube Base Waveform Diagram - CUB 3000 models

INTRODUCTION

The Cub 3000 monitor is based upon a series 3 chassis with a series 9 tube base, the two PCBs are connected via the rear audio input and user control PCB. The monitor is intended for use with the A3000 micro computer.

The monitor's basic specification is:

240V mains input;

R, G, B video inputs 75R impedance;

mixed positive going TTL sync;

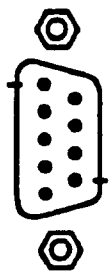
Audio input 200 mV via stereo minature jack plug;

Audio output via integral speaker;

Controls: mains on/off , contrast , brightness , volume

VIDEO LEAD INPUT

The video input is a 9-way D-type connection. The connection details are shown below, viewed from the solder side of the plug.



Connector Pin	Colour	Signal
1	Red	Video
2	Green	Video
3	Blue	Video
4	Brown	Mixed Sync
5		No connection
6		No connection
7		No connection
8		No connection
9	Black	0V

TUBE BASE PCB

GENERAL

Circuitry for the "CRT Tube Base and Video Output Stages" is contained on a separate PCB Assembly. This assembly plugs directly onto the base of the CRT.

Circuit interconnections between the Tube Base PCB Assembly and the main chassis - Drive/Deflection PCB Assembly are made by flexible interconnecting leads. Interconnection details are illustrated in a separate section.

A Circuit Diagram and a PCB layout for the Tube Base PCB are illustrated at the end of this section. A waveform diagram showing waveforms obtained at various test points is also illustrated at the end of this section.

CIRCUIT DESCRIPTIONS

For complete information on circuit functions and component references, the circuit descriptions should be read with reference to the Drive/Deflection PCB and Tube Base Circuit PCB Diagrams, along with the PCB layout for the Tube Base.

GENERAL CIRCUIT DESCRIPTION

The Tube Base panel contains the video output stages for all three channels as well as A1 and the Tube Base CRT socket. Grid G1 is connected directly to ground, via link LK940. All CRT electrodes are protected by a resistor, a spark gap and, in some cases, a capacitor returned to the aquadag ground. The spark gaps on all electrodes except the Focus are formed by means of a 1 to 2kV ring trap gap situated within the CRT base socket assembly, while the high voltage focus has a separate 10kV spark chamber also integral with the tube base socket.

The CRT cathodes are driven directly from the video output stages mounted on the CRT base panel. This improves product reliability, enhances the video bandwidth, improves stability and minimises RF radiation.

The CRT heater voltage is derived directly from the power supply on the Drive/Deflection PCB. The Focus voltage is taken directly from the diode-split transformer, also shown on the Drive/Deflection PCB.

GENERAL CIRCUIT CONFIGURATION

The Tube Base panel incorporates the video pre-amplifier, video output circuitry.

The mixed sync input is fed into IC902a, which is used to buffer the sync, which is then fed out to the main PCB.

The main PCB provides a 200V rail instead of the 137V required for the black level setting circuitry, the 200V is reduce by a 12K dropper resistor fitted in position D920.

A single ended video input in employed, components R901, 902, 903 forming the 75R input termination resistors. The RGB signals are applied to IC901, an LM1203 video processor device, at pins 6, 4 and 9 respectively. This device performs the functions of brightness, contrast, black level clamping, and has the facility to set the individual RGB gains. Feedback from the emitter of the cascode drivers in the output amplifiers TR903, 909, 906 enhances black level stability by maintaining the dc operating point of the video output amplifiers.

Contrast and brightness are controlled by the dc level applied at pins 12 and 15 respectively, of IC901, by the external "user" controls.

The video supply is 125V, rather than 105V as on a VGA model. As a result of this, the collector pull up resistors R967, R957, R947 are changed to 3k3 1watt components. The beam current feedback resistors R953, R963, R973 are also increased to maintain the same amplifier gain. The peaking chokes L901 - L907 are linked out to limit the bandwidth for RFI reasons. Heatsinks are no longer required because of the high collector load resistors used for the video output transistors.

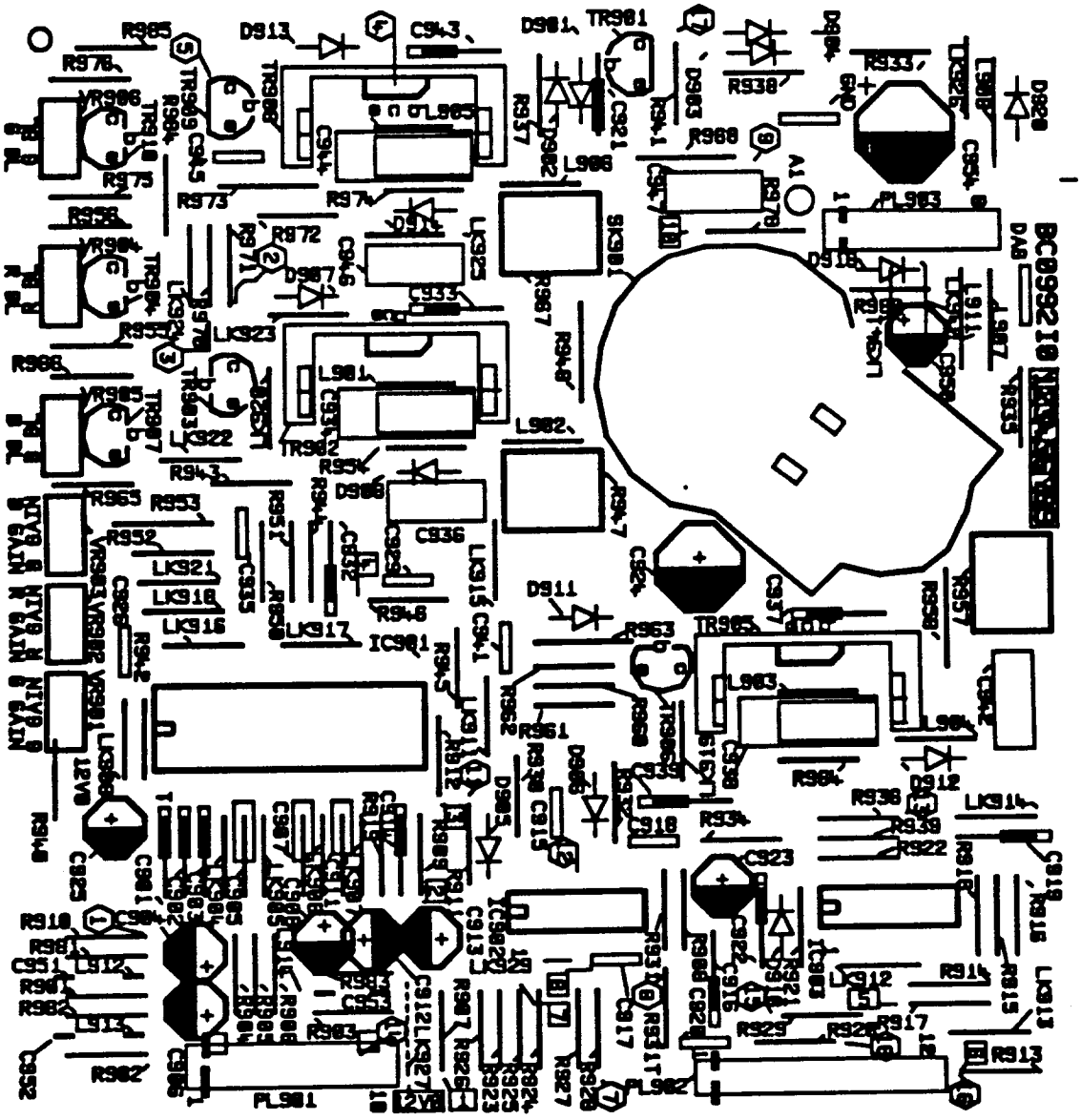
BLACK LEVEL CLAMPING

Black level clamping occurs immediately following the trailing edge of the horizontal sync pulses. A narrow clamp pulse is derived from the sync edge by differentiation by C915, R911 and clipped by D905. The resulting "squared-up" pulse present at pin 11 of IC902 is applied to pin 14, the clamp gate, of IC901.

BLANKING/VIDEO OUTPUTS

Mixed vertical and horizontal blanking pulses derived from the deflection panel are applied to the Baker clamped invertor stage TR901. When TR901 is driven "On", diodes D907, 911, 913 apply blanking to the three output amplifiers causing the upper cascode devices, TR902, 905, 908 to be turned off. To ensure a cut-off, these devices are referenced via their base connections to a supply which is twice the base-emitter voltage (2 x Vbes) below the +12V supply (D901, 902).

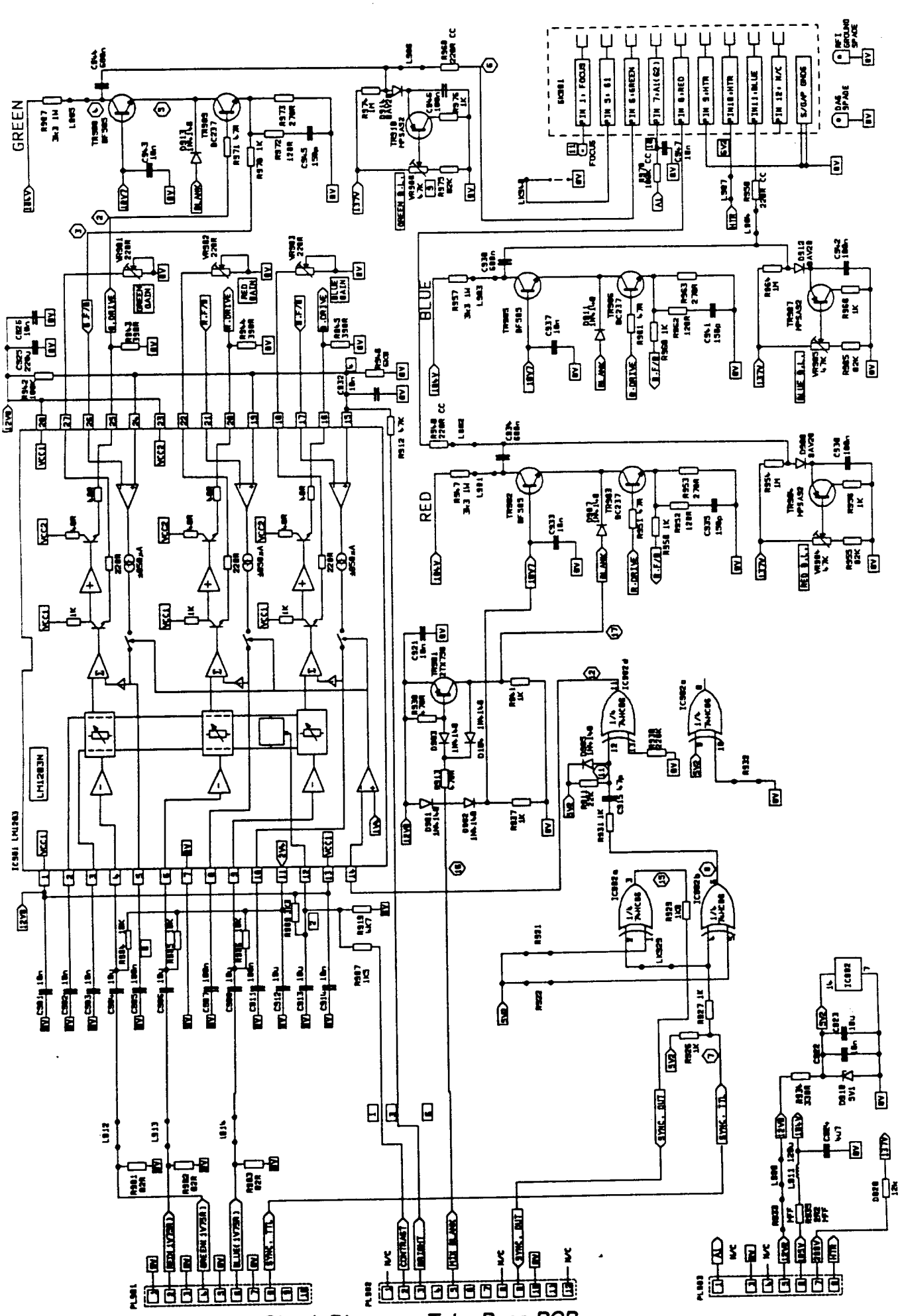
The video output amplifiers are cascoded class A type circuits. The supply voltage is 125V and the operating black level voltage is about 90V, providing some 25 to 30 volts of blanking at the CRT cathodes. The blanking amplitude is important in determining the CRT operating point. The video signals are AC coupled via C934, 938, 944 to the dc restorer circuits formed around TR904, 907, 910. It is the peak of the blanking pulse which is restored to the voltage at the slider of the black level potentiometers VR904, 905, 906 by diodes D908, 912, 914 in conjunction with TR904, 907, 910. The Black Levels are normally set to 110V and the video gains to 50V.



PCB Layout - Tube Base PCB

REFER TO THE SECTION AT THE REAR

Waveform Diagram - Tube Base PCB



Circuit Diagram - Tube Base PCB

MAIN PCB

DIFFERENCES FROM STANDARD SERIES 3

The Cub 3000 PCB is the same as the standard series 3 PCB with component changes and one track cut. The majority of the Cub 3000 main PCB circuitry is the same as standard series 3. The video processing circuitry is now done on the tube base PCB, so all the video input corner of the main PCB is unpopulated (IC101, TR103, 4, 5 etc).

The following areas of the Cub 3000 circuitry are identical to the standard series 3 products:-

1)

The sync separator and line oscillator circuitry (TDA1180 IC201) is unchanged.

2)

The field oscilllator and output stage (TDA1170 IC301) is unchanged with the exception of the east west circuitry which is not needed, because of the use of east west corrected tube.

3)

The line driver stage is as series 3 (TR201/T201).

4)

The line output stage is as series 3, with the exception of the grounding of the tripler which is changed to allow beam limiting and the heater supply is connected to true 0 volt via an over board brown wire link.

5)

The power supply is as series 3, it provides 200V, 124V, 18V and 12V.

6)

The main PCB video mixed blanking circuit is unchanged.

7)

The beam limit circuitry is modified and is now fitted to the rear input panel. R137/R140 part of the old beam limit circuitry are fitted with links to provide a 124V supply for the tube base.

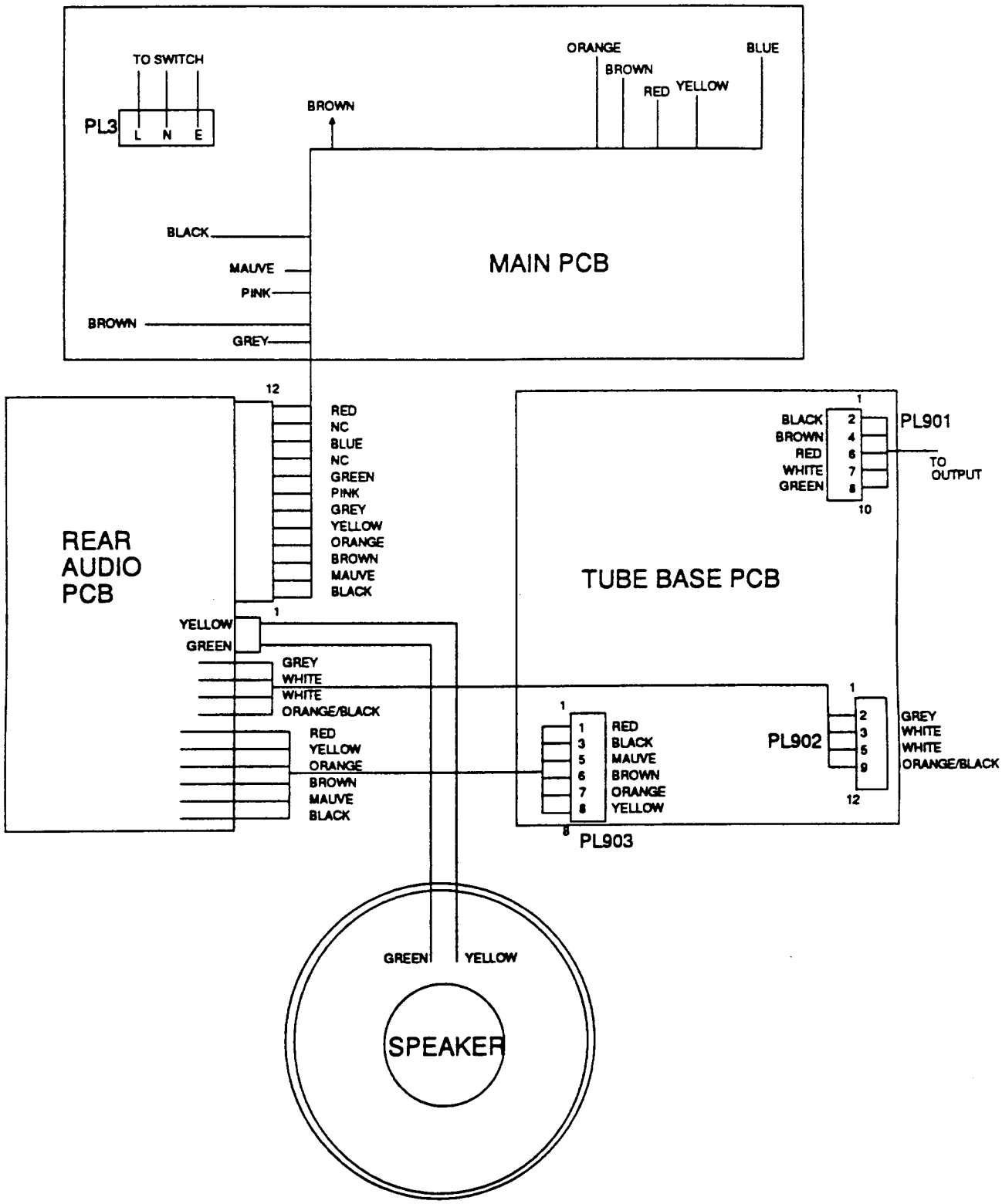
INTERCONNECTIONS OF PCBS

The main PCB to tube base connections are made via the rear Audio input board, the connection to this board is made by a 12 way pressac plug, the main end is hard wired using solder tags.

The tube base to input audio board connections are made by two hard wired harness cables which have plug connections at the tube base end.

MAIN PCB HARNESS WIRING DETAILS

Pin No	Colour	Function	Pin No	Colour	Function
1	BLK	PSU GROUND	8	GRN	18V supply
2	MAV	12V supply	9	NC	no connection
3	BRN	124V supply	10	BLU	Tripler ground
4	ORA	200V supply	11	NC	no connection
5	YEL	6v3 ac heater voltage	12	RED	A1 (G2) supply 700V approx
6	GRY	Sync output from tube base			
7	PNK	Blanking mixed for tube base			



Interconnection Diagram 14M325MA2

THE REAR AUDIO INPUT BOARD - General

The rear audio input board is a new PCB designed specifically for the Cub 3000 product, its functions are:

1)

Provide an audio amplifier circuit with stereo input and mono output with adjustable volume.

2)

Provide contrast and brightness control signals for the tube base amplifier, the board also provides physical mountings for pots.

3)

Provide A1 (G2) conings for pots.

4)

Provide beam current limit circuitry.

5)

The new PCB also provides a convenient way of interconnecting the series 3 main PCB to the series 9 tube base with a minimal number of harnesses. Also, as the pots are fitted direct to the PCB, there is no need for expensive interconnection leads.

REAR AUDIO INPUT BOARD - Circuit Description

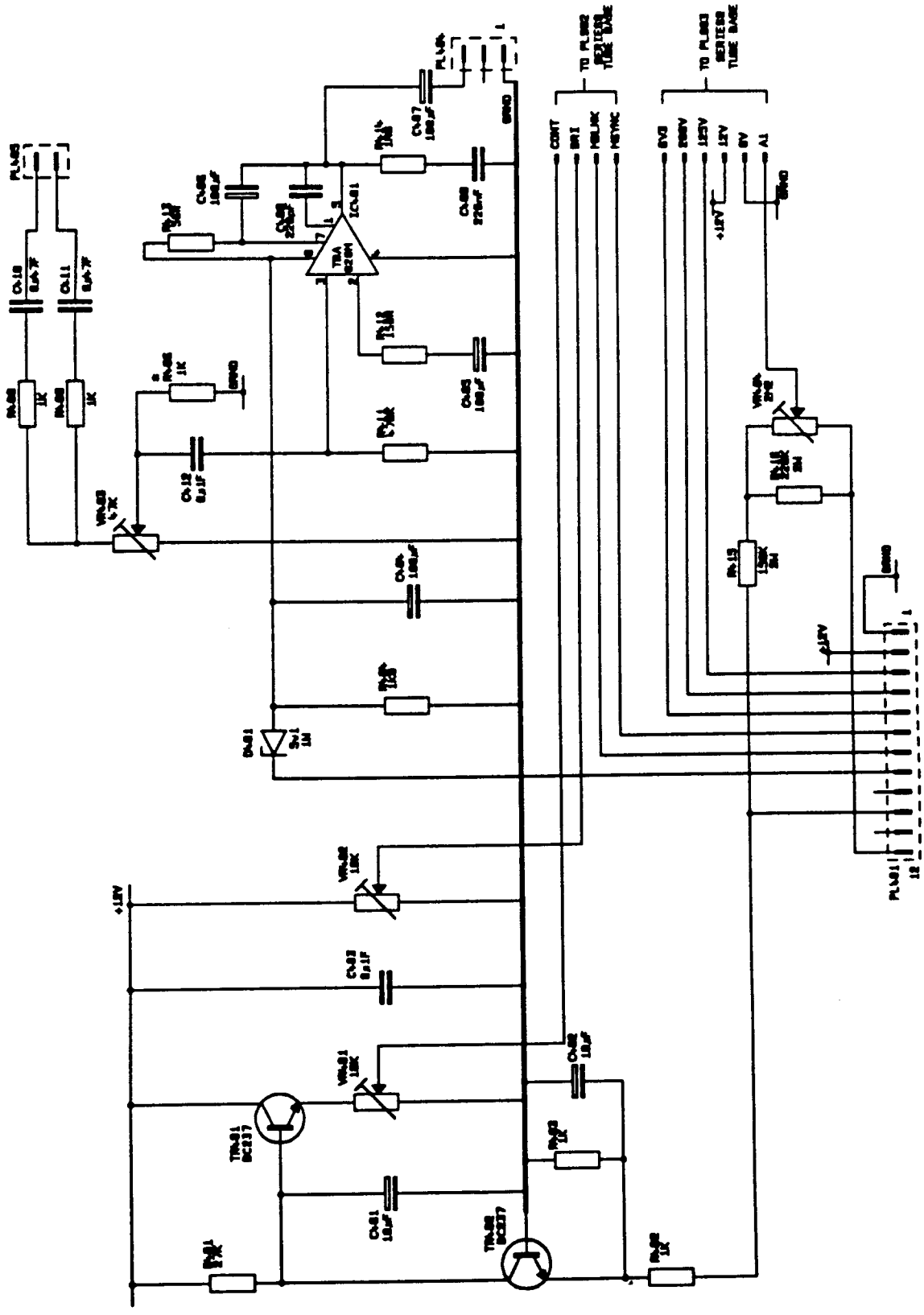
The audio amplifier circuit is based on the TDA 820M 1.2 watt 8 pin dip audio amplifier IC. The IC is supplied from the 18 volt power supply rail via a 5.1V dropper zenner diode so that the actual supply to the IC is 13V. R417 fusible 1RO resistor is used to protect the supply in case of IC failure.

The audio input to the rear PCB is via a minature stereo 3.5mm jack, the stereo audio signals are tne fed through PL405 and ac coupled by C410 and C411. The 1K resistors, R408 and R409 resistively add the stereo audio signals to provide a mono signal, this is then potted down by the 47K log volume control. Components C412 and R411 provide a high pass filter to reduce mains hum. The audio signal is then fed in to pin 3, the amplifier input. Resistor R412 sets the feed back level and hence the closed loop gain of the amplifier. C408 the 220pf capacitor sets the upper frequency stability preventing the amplifier from oscillating.

The contrast and brightness controls are located on the rear audio input board, the two controls supply variable dc voltages which are fed up to the tube base to control the LM1203N video amplifier IC. The brightness control pot is straight across the 12V supply rail, whereas the contrast pot is supplied via the beam limit circuit (voltages from 11.4 to 0v).

The beam limit circuit consists of two transistors TR402 and TR401. Under low or zero beam current conditions TR402 has insufficient bias to turn it on, thus TR401 configured as an emitter follower is pulled up via R401 to 12 volts, its emitter is therefore 0.7V lower and the full contrast range is available.

As the beam current approaches its limit value (700 µA) the voltage dropped across R403, which carries the average beam current approaches 0.7 volts, thus TR402 is biased on and the base of TR401 is pulled down. The emitter of TR401 falls in voltage and the available contrast range is reduced, thus limiting the beam current.



Circuit Diagram - Audio PCB - 14M325MA2

SERVICE SUPPLEMENT FOR SERIES 3 MODELS WITH SUFFIX 'C'

SERIES 3 SUPPLEMENT - ALL MODELS WITH SUFFIX 'C'

SUPPLEMENT TO THE SERVICE MANUAL FOR MODELS WITH SUFFIX 'C'

MODELS AFFECTED :

14M325MA2C	1431MS4C	1451MS4C
1439A2SC	1459A2SC	1431A2SC
1450MS4C	1451APMS4C.	

INTRODUCTION

All models with the suffix 'C' have a new Drive/Deflection PCB. The 14M325MA2C, 1431MS4C and 1451MS4C have a new cabinet back, with revised control positions. The 1431MS4C and 1451MS4C now have captive leads with DIN plugs instead of rear panel-mounting DIN sockets. The 14M325MA2C has a smaller Rear Audio Input PCB.

SAFETY NOTE

THE EHT CIRCUIT TO THE FINAL CRT ANODE DOES NOT HAVE A BLEED RESISTOR IN 'C' MODELS.THE FINAL ANODE WILL STILL BE CHARGED TO UP TO 25KV EVEN WHEN THE MONITOR IS SWITCHED OFF. BEFORE ATTEMPTING TO REMOVE THE FINAL ANODE BUTTON CONNECTOR, DISCHARGE THE FINAL ANODE WITH A SUITABLE EHT PROBE.

DRIVE/DEFLECTION PCB

SEE SAFETY NOTE, ABOVE, BEFORE SERVICING THIS AREA OF CIRCUITRY.

Power Supply, Video Inputs, Line Timebase and Field Timebase areas are substantially unchanged.

The most significant areas of change to the Drive/Deflection PCB are the Line Output, Line Drive and the addition of an Audio Amplifier.

LINE OUTPUT

The Line Output stage has the old Line Output Transformer and Tripler combination replaced by a Diode Split Transformer (DST), T203. Focus and A1 potentials are now derived within the DST and can be adjusted by the controls on the DST marked " FOCUS " and " SCREEN ", voltages emerge on leads which connect directly to the Tube Base. The area of circuitry on the Tube Base which was used to derive the A1 potential has now been removed. The DST is driven from a line flyback pulse on pin 2 of the DST. L202, L203 and T203 primary , are tuned during the flyback period by C222. Flyback time depends on the model. The Line output transistor, TR202, is driven directly from the secondary winding of T201, 'ON' current is controlled by R227, turn off by D202/R232.

Line linearity correction is provided by L203 and width control by L202 these are damped by C216, R228. 'S' correction is provided by C218.

Current for the line output is from the B+ (voltage varies from 123 to 130V, depending on model) via a resistor, R231, to reduce breathing effects, into pin 3. Pins 4 and 5 generate the Frame Output volts, approx. 25V. Pins 6 and 10 generate the Heater volts for the CRT, the voltage applied is reduced by R237 to approx. 6.0V RMS.

EHT current is taken from pin 7 of the DST, this is smoothed by C107 and limited by R141 before being applied to the Beam Current Limit circuitry at the junction of D117/D118. When this current becomes excessive the Beam Current Limit circuitry reduces the drives via the contrast control.

LINE DRIVE

The Line Drive circuit (TR201 and T201) is driven from horizontal drive pulses on pin 3 of IC201, these are AC coupled to TR201 and used to control the driver transformer (T201). T201 gives the impedance conversion necessary to provide 600mA forward base current for saturation of the output transistor, TR202. Ringing is damped by R225/R230 and C214 at TR201 turn off, thus limiting its Vce to a safe value. The Driver stage is now powered from the +18V rail via R226.

AUDIO AMPLIFIER

An audio amplifier has now been included on the Drive/Deflection PCB for use in the 14M325MA2C, where there is now no amplifier on the Rear Audio Input Board. The audio amplifier circuit is based on the TDA820M 1.2 Watt 8 pin DIP audio amplifier IC. The IC is supplied from the 18 volt power supply rail via a 5.1V dropper zener diode (D501) and fusible resistor (R506) so that the actual supply to the IC is 13V. Stereo audio is now resistively summed on the Rear Audio Input Board and passed on to the audio amplifier on the Drive /Deflection PCB via a screened lead connecting to PL501. Impedences are kept low to allow termination by R502/C508 which reduce pick-up. Signal input to the IC is on pin 3, resistor R503 sets the feed back level and hence the closed loop gain of the amplifier. C505 sets the upper frequency stability, preventing the amplifier from oscillating. Audio output is coupled via C507 to PL502, the loudspeaker connection.

TUBE BASE (models other than 14M325MA2C)

The A1 circuitry has now been removed from the tube base and the A1 voltage from the DST connects to the A1 CRT electrode via R931. Beam Current Limit is no longer routed via the Tube Base so the former 'floating' earth of the spark gaps is now connected to 0V.

REAR AUDIO INPUT BOARD (14M325MA2C only)

Beam Current Limit, A1 control and the audio amplifier have now been removed from this panel. Brightness and Contrast controls remain, audio now enters via the miniature 3.5mm jack, is resistively summed by R408/409 and AC coupled to the volume control. Audio connects to the audio amplifier on the Drive/Deflection panel via PL404.

CAPACITORS

Component	Description	Part Number
C1	CAP. MET/P 0.22µF 250VAC ***	CX225NL6
C2	CAPACITOR CER. 1000PF 250V ***	CY103NL6
C3	CAPACITOR CER. 1000PF 250V ***	CY103NL6
C4	CAP. MET/P 0.22µF 250VAC ***	CX225NL6
C5	CAPACITOR CER. 470PF 2KV 10%	CD472YL6
C6	CAPACITOR MET/P 0.01µF 630V	CM104TL6
C7	CAPACITOR CER. 470PF 2KV 10%	CD472YL6
C8	CAPACITOR MET/P 0.01µF 630V	CM104TL6
C11	CAPACITOR A/E 100µF 400V 20%	CA108RL7
C12	CAPACITOR A/ELEC 4.7µF 20% 50V	CA476JL7
C13	CAP MET/POLY 0.1µF 400V 10%	CM105RK6
C14	CAP MET/POLY 0.1µF 400V 10%	CM105RK6
C15	CAPACITOR CER. 4700pF 100V	CD473KK6
C16	CAPACITOR POLY. 10nF 160V 10%	CR104MK0
C17	CAPACITOR P/P 2200PF 1500V ***	CL223XJ6
C18	CAPACITOR ALUM/E 1µF 63V. 20%	CA1068L0
C20	CAPACITOR CER. 1000PF 250V ***	CY103NL6
C22	CAPACITOR CERAMIC PL.2.2nF100V	CC223KK6
C23	CAPACITOR A/ELEC 4.7µF 20% 50V	CA476JL7
C24	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C25	CAPACITOR CER. 470pf 500V	CD472SK7
C26	CAPACITOR ALUM/E 47µF 250V	CA477NM7
C27	CAPACITOR ALUM/E 47µF 250V	CA477NM7
C28	CAPACITOR ALUM/E 47µF 250V	CA477NM7
C30	CAPACITOR CER. 470pf 500V	CD472SK7
C31	CAPACITOR ALUM/E 470µF 25V	CA478FM7
C32	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C33	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C34	CAPACITOR ALUM/E 220µF 25V	CA228FM7
C101	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C102	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C103	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C104	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C105	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C106	CAPACITOR MET/P 0.22µF 100V	CM225KK6

1431MS4C COMPONENTS LIST

Component	Description	Part Number
C107	CAPACITOR MET/P 0.47µF 100V	CM475KL6
C201	CAPACITOR CER. 100pf 100V 10%	CD102KK6
C202	CAPACITOR CER. 100pf 100V 10%	CD102KK6
C203	CAPACITOR MET/P 0.47µF 100V	CM475KL6
C204	CAPACITOR MET/P 0.22µF 100V	CM225KK6
C205	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C206	CAPACITOR ALUM/E 1µF 63V. 20%	CA1068L0
C207	CAPACITOR A/ELEC 4.7µF 20% 50V	CA476JL7
C208	CAPACITOR MET/P 0.01µF 630V	CM104TL6
C210	CAPACITOR CER.4700pF 50V 5% AX	CJ473JJ0
C211	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C212	CAPACITOR ALUM/E 220µF 25V	CA228FM7
C213	CAPACITOR MET/P 0.22µF 100V	CM225KK6
C214	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C215	CAPACITOR A/E 100µF 35V TWSS	CA108HL7
C216	CAPACITOR CER. 470pf 500V	CD472SK7
C217	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C218	CAP P/P 0.33µF 250V 10% ***	CL335NK6
C220	CAPACITOR MET/P 0.01µF 630V	CM104TL6
C221	CAPACITOR MET/P 0.47µF 400V	CM475RL6
C222	CAPACITOR P/P 6n8 1.5Kv 5%***	CL683XJ9
C224	CAPACITOR A/E 1000µF 50V. 20%	CA109JL7
C301	CAPACITOR MET/P 0.22µF 100V	CM225KK6
C302	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C303	CAPACITOR MET/P. 150nF 100V	CM155KK6
C304	CAPACITOR A/E 100µF 35V TWSS	CA108HL7
C305	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C306	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C307	CAPACITOR CER/T 82PF 50V 5% AX	CK821JJ0
C308	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C310	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C311	CAPACITOR A/E 470µF 35V	CA478HM7
C313	CAPACITOR A/E 100µF 35V TWSS	CA108HL7
C314	CAPACITOR CER/D 1nF 50V. 10%	CD103JK6
C901	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C902	CAPACITOR CER/T 22PF 5% 50V	CK221JJ0
C903	CAPACITOR CERAMIC/T 120pF 5%	CK122JJ0
C904	CAPACITOR CER/T 22PF 5% 50V	CK221JJ0
C905	CAPACITOR CERAMIC/T 120pF 5%	CK122JJ0

Component	Description	Part Number
C906	CAPACITOR CER/T 22PF 5% 50V	CK221JJ0
C907	CAPACITOR CERAMIC/T 120pF 5%	CK122JJ0
C910	CAPACITOR CER.10nF 2KV -20+80%	CD104YP7
C911	CAPACITOR CER.10nF 2KV -20+80%	CD104YP7

DIODES

Component	Description	Part Number
D1	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D2	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D3	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D4	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D6	DIODE BA157	DF0157UU0
D7	DIODE FAST RECOVERY BYV96E	DF0096UU0
D8	DIODE IN4148 UNIVERSAL	DS4148UU0
D10	DIODE IN4148 UNIVERSAL	DS4148UU0
D11	DIODE IN4148 UNIVERSAL	DS4148UU0
D12	DIODE IN4148 UNIVERSAL	DS4148UU0
D13	DIODE IN4148 UNIVERSAL	DS4148UU0
D14	DIODE IN4148 UNIVERSAL	DS4148UU0
D15	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D16	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D17	DIODE BA159 UNIVERSAL	DF0159UU0
D18	DIODE BZY88B7V5 2%	DZ88750FB0
D20	DIODE ZENER BZX79B33V 2%	DZ79331FB0
D21	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D22	DIODE BA159 UNIVERSAL	DF0159UU0
D23	DIODE FAST RECOVERY BYV96E	DF0096UU0
D24	DIODE BA157	DF0157UU0
D25	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D101	DIODE IN4148 UNIVERSAL	DS4148UU0
D102	DIODE IN4148 UNIVERSAL	DS4148UU0
D103	DIODE IN4148 UNIVERSAL	DS4148UU0
D104	DIODE IN4148 UNIVERSAL	DS4148UU0
D105	DIODE IN4148 UNIVERSAL	DS4148UU0
D106	DIODE IN4148 UNIVERSAL	DS4148UU0
D107	DIODE IN4148 UNIVERSAL	DS4148UU0
D108	DIODE ZENER BZX79B5V6 2%	DZ79560FB0

Component	Description	Part Number
D110	DIODE ZENER BZX79B5V6 2%	DZ79560FB0
D111	DIODE ZENER BZX79B5V6 2%	DZ79560FB0
D116	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D117	DIODE ZENER BZX79B12V 2%	DZ79121FB0
D118	DIODE ZENER BZX79B5V6 2%	DZ79560FB0
D201	DIODE BA157	DF0157UU0
D202	DIODE BA159 UNIVERSAL	DF0159UU0
D203	DIODE IN4148 UNIVERSAL	DS4148UU0
D301	DIODE IN4148 UNIVERSAL	DS4148UU0
D302	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D901	DIODE IN4148 UNIVERSAL	DS4148UU0
D902	DIODE IN4148 UNIVERSAL	DS4148UU0
D903	DIODE IN4148 UNIVERSAL	DS4148UU0
D904	DIODE IN4148 UNIVERSAL	DS4148UU0
D905	DIODE IN4148 UNIVERSAL	DS4148UU0
D906	DIODE IN4148 UNIVERSAL	DS4148UU0
D907	DIODE ZENER BZX79B6V8 2%	DZ79680FB0
D908	DIODE IN4148 UNIVERSAL	DS4148UU0
D909	DIODE IN4148 UNIVERSAL	DS4148UU0

FUSES

Component	Description	Part Number
F1	FUSE 5x20mm T2A ANTISURGE ***	KA2001BA0
F1	T 2A FUSEHOLDER L222/K ***	KS0003Y01
F3	1A FUSEHOLDER L222/K ***	KS0003Y01
F3	FUSE 5 x 20mm F1A FAST BLOW***	KA1001BQ0

INTEGRATED CIRCUITS

Component	Description	Part Number
IC1	HEATSINK V6-2L 01	HH0003HA0
IC1	RIVSCREW AVDEL 1712-3509	HR0003VJ0
IC1	CIRCUIT INT 78M12 +12V	IV7812MU3
IC101	CIRCUIT INT. SN74LS136N	IT74136MU2
IC102	CIRCUIT INT. 78L05	IV7805LU0

Component	Description	Part Number
IC201	CIRCUIT INT TDA1180P UNIVERSAL	IL1180PU2
IC301	CIRCUIT INT TDA11705 UNIVERSAL	IL1170SU2

INDUCTORS

Component	Description	Part Number
L1	COIL DEGAUSS 14INCH 240V ***	LD002KA6
L2	CHOKE 10uH	LW104UA7
L201	CHOKE 15uH B78108-T1153-K	LW154SK2
L202	COIL WIDTH	LV001UA5
L203	COIL LINEARITY PHILIPS	LN005UA6
L901	CHOKE 15uH B78108-T1153-K	LW154SK2
L924	CHOKE 15uH B78108-T1153-K	LW154SK2
L925	CHOKE 15uH B78108-T1153-K	LW154SK2
L926	CHOKE 15uH B78108-T1153-K	LW154SK2

LINKS/SHORT CIRCUITS

Component	Description	Part Number
LK1 to LK17	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
LK19 , LK20	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
LK23 to LK30	ZEROHM SHORT CIRCUIT LINK	WL6300TU1

PLUGS

Component	Description	Part Number
PL1	PLUG 6 WAY 320/3766 GREY	KP0300D06
PL2	PLUG PCB LOCK 3 WAY B OUT	KP0025A03
PL3	PLUG 5 WAY 320/3765 -2-4 PINS	KP0300D05
PL101	PLUG PCB LOCK 10 WAY	KP0026A10
PL103	PLUG 10 WAY 20/3430 PRES. 01	KP0025A10

RESISTORS

Component	Description	Part Number
R2	RESISTOR M/FILM 180K 2W 5%	RM185LJ0
R3	RESISTOR M/FILM 3K9 0.25W 1%	RM393DH0
R5	RESISTOR M/FILM 10K 1/4W 1%	RM104DH0
R6	RESISTOR W/W 15K 7W 308-3 VTM	RW154VJ8
R7	RESISTOR C/F 47R 1/4W 5% 02	RF471DJ0
R8	RESISTOR M/FILM 22K 0.75W 2%	RM224II0
R10	RESISTOR C/F 390R 1/4W 5% 02	RF392DJ0
R11	RESISTOR C/F 22R 1/4W 5% 01	RF221DJ0
R12	RESISTOR W/W 1K0 7W VTM 308-3	RW103VJ8
R13	RESISTOR C/F 27K 1/4W 5% 01	RF274DJ0
R14	RESISTOR C/F 100R 1/4W 5% 01	RF102DJ0
R15	RESISTOR MET/O 1R5 2W 5% 01	R0150LJ0
R16	RESISTOR W/W 1K0 7W VTM 308-3	RW103VJ8
R17	RESISTOR MET/G 3M3 1/2W 5% ***	RG336GJ0
R21	RESISTOR C/F 390R 1/4W 5% 02	RF392DJ0
R22	RESISTOR C/F 680R 1/4W 5% 01	RF682DJ0
R23	RESISTOR C/F 4K7 1/4W 5% 03	RF473DJ0
R24	RESISTOR C/F 22K 1/4W 5% 02	RF224DJ0
R25	RESISTOR MET/O 4R7 2W 5% 01	R0470LJ0
R26	RESISTOR FUS/F 4R7 1/2W 5% ***	RL470GJ0
R27	RESISTOR C/F 120K 1/4W 5% 01	RF125DJ0
R29	RESISTOR C/F 180K 1/4W 5% 01	RF185DJ0
R30	RESISTOR W/W 1K0 7W VTM 308-3	RW103VJ8
R31	RESISTOR M/FILM 22K 0.75W 2%	RM224II0
R101	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R102	RESISTOR C/F 150R 1/4W 5%	RF152DJ0
R103	RESISTOR C/F 150R 1/4W 5%	RF152DJ0
R104	RESISTOR C/F 150R 1/4W 5%	RF152DJ0
R105	RESISTOR C/F 150R 1/4W 5%	RF152DJ0
R106	RESISTOR C/F 150R 1/4W 5%	RF152DJ0
R107	RESISTOR C/F 150R 1/4W 5%	RF152DJ0
R108	RESISTOR C/F 47K 1/4W 5% 03	RF474DJ0
R110	RESISTOR C/F 47K 1/4W 5% 03	RF474DJ0
R112	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R113	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0

1431MS4C COMPONENTS LIST

Component	Description	Part Number
R114	RESISTOR C/F 470R 1/4W 5% 08	RF472DJ0
R115	RESISTOR C/F 470R 1/4W 5% 08	RF472DJ0
R116	RESISTOR C/F 470R 1/4W 5% 08	RF472DJ0
R117	RESISTOR C/F 680R 1/4W 5% 01	RF682DJ0
R118	RESISTOR C/F 220R 1/4W 5% 06	RF222DJ0
R120	RESISTOR C/F 470R 1/4W 5% 08	RF472DJ0
R121	RESISTOR C/F 1K5 1/4W 5% 05	RF153DJ0
R122	RESISTOR C/F 1K5 1/4W 5% 05	RF153DJ0
R123	RESISTOR C/F 1K5 1/4W 5% 05	RF153DJ0
R124	RESISTOR C/F 220R 1/4W 5% 06	RF222DJ0
R125	RESISTOR C/F 1K5 1/4W 5% 05	RF153DJ0
R126	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R127	RESISTOR C/F 220R 1/4W 5% 06	RF222DJ0
R128	RESISTOR C/F 220R 1/4W 5% 06	RF222DJ0
R130	RESISTOR C/F 220R 1/4W 5% 06	RF222DJ0
R131	RESISTOR C/F 100R 1/4W 5% 01	RF102DJ0
R132	RESISTOR C/F 100R 1/4W 5% 01	RF102DJ0
R133	RESISTOR C/F 100R 1/4W 5% 01	RF102DJ0
R135	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R136	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R137	RESISTOR C/F 82K 1/4W 5% 01	RF824DJ0
R140	RESISTOR C/F 47K 1/4W 5% 03	RF474DJ0
R141	RESISTOR C/F 2K7 1/4W 5% 02	RF273DJ0
R201	RESISTOR C/F 2K7 1/4W 5% 02	RF273DJ0
R202	RESISTOR C/F 2K2 1/4W 5% 07	RF223DJ0
R203	RESISTOR C/F 6M8 1/4W 5% 01	RF686DJ0
R204	RESISTOR C/F 1M5 1/4W 5% 01	RF156DJ0
R205	RESISTOR C/F 2M2 1/4W 5% 01	RF226DJ0
R206	RESISTOR C/F 39K 1/2W 5% 03	RF394GJ0
R207	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R208	RESISTOR C/F 10R 1/4W 5% 01	RF101DJ0
R210	RESISTOR C/F 820K 1/4W 5% 01	RF825DJ0
R211	RESISTOR C/F 1K2 1/4W 5% 01	RF123DJ0
R212	RESISTOR C/F 3K6 1/4W 5% 02	RF363DJ0
R213	RESISTOR C/F 100K 1/4W 5% 01	RF105DJ0
R214	RESISTOR C/F 220K 1/2W 5% 01	RF225GJ0
R215	RESISTOR C/FILM 9K1 1/4 W	RF913DJ0
R216	RESISTOR C/F 82K 1/4W 5% 01	RF824DJ0
R217	RESISTOR C/F 22K 1/4W 5% 02	RF224DJ0

Component	Description	Part Number
R221	RESISTOR C/F 100K 1/4W 5% 01	RF105DJ0
R222	RESISTOR C/F 150K 1/4W 5% 02	RF155DJ0
R223	RESISTOR C/F 100R 1/4W 5% 01	RF102DJ0
R224	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R225	RESISTOR C/F 330R 1/2W +/- 5%%	RF332GJ0
R226	RESISTOR FUS/F 4R7 1/2W 5% ***	RL470GJ0
R227	RESISTOR MET/O 1R0 1W 5% 01	R0100JJ0
R228	RESISTOR C/F 1K0 1/2W 5%	RF103GJ0
R230	RESISTOR C/F 330R 1/2W +/- 5%%	RF332GJ0
R231	TAG SUPPORT FOR WW RES 04	HM0001RS0
R231	RESIST W/W FUS.15R 5.5W 5% ***	RX151SJ6
R232	RESISTOR C/F 27R 1/2W +/- 5%	RF271GJ0
R233	RESISTOR C/F 39K 1/2W 5% 03	RF394GJ0
R234	RESISTOR C/F 39K 1/2W 5% 03	RF394GJ0
R235	RESISTOR FUS/F 4R7 1/2W 5% ***	RL470GJ0
R237	RESISTOR C/F 1R0 1/2W 5%	RF100GJ0
R301	RESISTOR C/F 680K 1/4W 5% 02	RF685DJ0
R302	RESISTOR C/F 12K 1/4W 5% 01	RF124DJ0
R303	RESISTOR C/F 470K 1/4W 5% 03	RF475DJ0
R304	RESISTOR C/F 470K 1/4W 5% 03	RF475DJ0
R305	RESISTOR C/F 680K 1/4W 5% 02	RF685DJ0
R308	RESISTOR C/F 150K 1/4W 5% 02	RF155DJ0
R310	RESISTOR C/F 1K8 1/4W 5% 04	RF183DJ0
R311	RESISTOR C/F 5K6 1/4W 5% 02	RF563DJ0
R313	RESISTOR C/F 47K 1/4W 5% 03	RF474DJ0
R314	RESISTOR C/F 47K 1/4W 5% 03	RF474DJ0
R315	RESISTOR C/F 220K 1/4W 5% 02	RF225DJ0
R316	RESISTOR C/F 18K 1/4W 5% 02	RF184DJ0
R317	RESISTOR C/F 5K6 1/4W 5% 02	RF563DJ0
R318	RESISTOR C/F 18K 1/4W 5% 02	RF184DJ0
R320	RESISTOR C/F 3R3 1/4W 5% 01	RF330DJ0
R322	RESISTOR M/F 220R 0.75W 2%	RM222II0
R323	RESISTOR C/F 1R0 1/4W 5% 01	RF100DJ0
R329	RESISTOR C/F 33R 1/4W 5% 01	RF331DJ0
R901	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R902	RESISTOR C/F 2K7 1/4W 5% 02	RF273DJ0
R904	RESISTOR MET.OXIDE 15K 2W 5%03	R0154LJ0
R905	RESISTOR C/F 2K7 1/4W 5% 02	RF273DJ0
R907	RESISTOR M/FUS 100R 1/4W 5%***	RL102DJ0

1431MS4C COMPONENTS LIST

Component	Description	Part Number
[illegible]	RESISTOR C/F CKT 1/4W 5% 0R	RF273DJ0

Component	Description	Part Number
TR2	BUSH TRANSISTOR NYLON	YN0001BU0
TR2	WASHER M3 INT SHKPRF PLT 07	HW3000BA0
TR2	NUT M3 FULL HEX.PLATED	HN0300HA0
TR101	TRANSISTOR BC337-RL1	QS0337UT0
TR102	TRANSISTOR 2N4123	QS4123UU0
TR103	TRANSISTOR 2N4125	QS4125UU5
TR104	TRANSISTOR 2N4125	QS4125UU5
TR105	TRANSISTOR 2N4125	QS4125UU5
TR106	TRANSISTOR BC337-RL1	QS0337UT0
TR201	TRANSISTOR ZTX652	QS0652UU0
TR202	TRANSISTOR BU508DFI	QQ5080DS0
TR302	TRANSISTOR BC337-RL1	QS0337UT0
TR303	TRANSISTOR BC307-5	QS0307UU5
TR901	TRANSISTOR MPSA42	QS0042UU0
TR902	TRANSISTOR BF869 UNIVERSAL	QS0869UU0
TR903	TRANSISTOR MPSA42	QS0042UU0
TR904	TRANSISTOR BF869 UNIVERSAL	QS0869UU0
TR905	TRANSISTOR MPSA42	QS0042UU0
TR906	TRANSISTOR BF869 UNIVERSAL	QS0869UU0
TR907	TRANSISTOR ZTX650 01	QS0650UF0

THYRISTORS

Component	Description	Part Number
TY1	THYRISTOR 30-100V 0.8A FAST	QY0102UU0
TY2	FIT REVERSED THYRISTOR X0102DA	QY0102DC0

VARIABLE RESISTORS

Component	Description	Part Number
VR4	POT.PRESET 1K0 0.1W 20% HZ 04	RQ103AL2
VR111	PLUG PCB LOCK 5 WAY BD OUT	KP0025A05
VR134	POT.PRESET 1K0 0.1W 20% HZ 04	RQ103AL2
VR218	POT.PRESET 22K 0.1W 20% VT 01	RQ224AL1
VR220	POT.PRESET 220K 0.1W 20% VT 01	RQ225AL1
VR306	POT.PRESET 470K 0.1W 20% VT 01	RQ475AL1

Component	Description	Part Number
VR307	POT.PRESET 100K 0.1W 20% VT 02	RQ105AL1
VR312	POT.PRESET 100K 0.1W 20% VT 02	RQ105AL1
VR321	POT PRESET 10K 0.1W 20% HZ	RQ104AL2
VR903	POT.PRESET 1K0 0.1W 20% HZ 04	RQ103AL2
VR906	POT 2K2 0.1W 20% PT10V PIHER	RQ223AL2
VR910	POT.PRESET 1K0 0.1W 20% HZ 04	RQ103AL2
VR914	POT 2K2 0.1W 20% PT10V PIHER	RQ223AL2
VR916	POT.PRESET 1K0 0.1W 20% HZ 04	RQ103AL2
VR921	POT 2K2 0.1W 20% PT10V PIHER	RQ223AL2

THERMISTORS

Component	Description	Part Number
TH2	THERMISTOR 15OHMS 30% K231	RT003NN0
TH1	THERMISTOR 263100P2332T333 01	RT005QN0

CAPACITORS

Component	Description	Part Number
C1	CAP. MET/P 0.22µF 250VAC ***	CX225NL6
C2	CAPACITOR CER. 1000PF 250V ***	CY103NL6
C3	CAPACITOR CER. 1000PF 250V ***	CY103NL6
C4	CAP. MET/P 0.22µF 250VAC ***	CX225NL6
C5	CAPACITOR CER. 470PF 2KV 10%	CD472YL6
C6	CAPACITOR MET/P 0.01µF 630V	CM104TL6
C7	CAPACITOR CER. 470PF 2KV 10%	CD472YL6
C8	CAPACITOR MET/P 0.01µF 630V	CM104TL6
C11	CAPACITOR A/E 100µF 400V 20%	CA108RL7
C12	CAPACITOR A/ELEC 4.7µF 20% 50V	CA476JL7
C13	CAP MET/POLY 0.1µF 400V 10%	CM105RK6
C14	CAP MET/POLY 0.1µF 400V 10%	CM105RK6
C15	CAPACITOR CER. 4700pF 100V	CD473KK6
C16	CAPACITOR POLY. 10nF 160V 10%	CR104MK0
C17	CAPACITOR P/P 2200PF 1500V ***	CL223XJ6
C18	CAPACITOR ALUM/E 1µF 63V. 20%	CA1068L0
C20	CAPACITOR CER. 1000PF 250V ***	CY103NL6
C22	CAPACITOR CERAMIC PL.2.2nF100V	CC223KK6
C23	CAPACITOR A/ELEC 4.7µF 20% 50V	CA476JL7
C24	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C25	CAPACITOR CER. 470pf 500V	CD472SK7
C26	CAPACITOR ALUM/E 47µF 250V	CA477NM7
C27	CAPACITOR ALUM/E 47µF 250V	CA477NM7
C28	CAPACITOR ALUM/E 47µF 250V	CA477NM7
C30	CAPACITOR CER. 470pf 500V	CD472SK7
C31	CAPACITOR ALUM/E 470µF 25V	CA478FM7
C32	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C33	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C34	CAPACITOR ALUM/E 220µF 25V	CA228FM7
C105	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C106	CAPACITOR MET/P 0.22µF 100V	CM225KK6
C107	CAPACITOR MET/P 0.47µF 100V	CM475KL6
C108	CAPACITOR CER. 4700pF 100V	CD473KK6
C202	CAPACITOR CER. 100pf 100V 10%	CD102KK6
C203	CAPACITOR MET/P 0.47µF 100V	CM475KL6

14M325MA2C COMPONENTS LIST

Component	Description	Part Number
C204	CAPACITOR MET/P 0.22µF 100V	CM225KK6
C205	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C206	CAPACITOR ALUM/E 1µF 63V. 20%	CA1068L0
C207	CAPACITOR A/ELEC 4.7µF 20% 50V	CA476JL7
C208	CAPACITOR MET/P 0.01µF 630V	CM104TL6
C210	CAPACITOR CER.4700pF 50V 5% AX	CJ473JJ0
C211	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C212	CAPACITOR ALUM/E 220µF 25V	CA228FM7
C213	CAPACITOR MET/P 0.22µF 100V	CM225KK6
C214	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C215	CAPACITOR A/E 100µF 35V TWSS	CA108HL7
C216	CAPACITOR CER. 470pf 500V	CD472SK7
C217	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C218	CAP P/P 0.33µF 250V 10% ***	CL335NK6
C220	CAPACITOR MET/P 0.01µF 630V	CM104TL6
C221	CAPACITOR MET/P 0.47µF 400V	CM475RL6
C222	CAPACITOR P/P 9n1 1500V 5% ***	CL913XJ6
C224	CAPACITOR A/E 1000µF 50V. 20%	CA109JL7
C301	CAPACITOR MET/P 0.22µF 100V	CM225KK6
C302	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C303	CAPACITOR MET/P. 150nF 100V	CM155KK6
C304	CAPACITOR A/E 100µF 35V TWSS	CA108HL7
C305	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C306	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C307	CAPACITOR CER/T 82PF 50V 5% AX	CK821JJ0
C308	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C310	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C311	CAPACITOR A/E 470µF 35V	CA478HM7
C313	CAPACITOR A/E 100µF 35V TWSS	CA108HL7
C314	CAPACITOR CER/D 1nF 50V. 10%	CD103JK6
C407 to C412	WIRE FLEX 24AWG UL1007 WHITE	WX2401LW0
C410	CAP.A/E 10µF 16V 20% 7.0LGx5.0	CA107EL2
C411	CAP.A/E 10µF 16V 20% 7.0LGx5.0	CA107EL2
C501	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C502	CAPACITOR A/E 100µF 35V TWSS	CA108HL7
C503	CAPACITOR A/E 100µF 35V TWSS	CA108HL7
C504	CAPACITOR A/E 100µF 35V TWSS	CA108HL7
C505	CAPACITOR CERAMIC/T 220pF 50V	CK222JK0
C506	CAPACITOR MET/P 0.22µF 100V	CM225KK6

14M325MA2C COMPONENTS LIST

Component	Description	Part Number
C507	CAPACITOR ALUM/E 470µF 25V	CA478FM7
C508	CAPACITOR CER. 4700pF 100V	CD473KK6
C901	CAPACITOR CER/T 10nF 25V 20%	CK104FL0
C902	CAPACITOR CER/T 10nF 25V 20%	CK104FL0
C903	CAPACITOR CER/T 10nF 25V 20%	CK104FL0
C904	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C905	CAPACITOR MET/P 0.1µF 63V 10%	CM1058K6
C906	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C907	CAPACITOR MET/P 0.1µF 63V 10%	CM1058K6
C908	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C911	CAPACITOR MET/P 0.1µF 63V 10%	CM1058K6
C912	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C913	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C914	CAPACITOR CER/T 10nF 25V 20%	CK104FL0
C915	CAP.CER.47pF 100V.10% RAD UNP	CC471KK6
C921	CAPACITOR CER/T 10nF 25V 20%	CK104FL0
C922	CAPACITOR CER/T 10nF 25V 20%	CK104FL0
C923	CAP A/ELEC 10µF 50V 20% RAD PR	CA107JL7
C924	CAP. ALUM/E 4.7µF 20% 160V.	CA476ML7
C925	CAPACITOR ALUM/E 220µF 25V	CA228FM7
C926	CAPACITOR CER. DISC 10nF 100V	CD104KP7
C932	CAPACITOR CER/T 10nF 25V 20%	CK104FL0
C933	CAPACITOR CER/T 10nF 25V 20%	CK104FL0
C934	CAPACITOR MET/P 680nF 100V 10%	CM685KK6
C935	CAP. CER/PL 150pF 2% 100V	CC152KI6
C936	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C937	CAPACITOR CER/T 10nF 25V 20%	CK104FL0
C938	CAPACITOR MET/P 680nF 100V 10%	CM685KK6
C941	CAP. CER/PL 150pF 2% 100V	CC152KI6
C942	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C943	CAPACITOR CER/T 10nF 25V 20%	CK104FL0
C944	CAPACITOR MET/P 680nF 100V 10%	CM685KK6
C945	CAP. CER/PL 150pF 2% 100V	CC152KI6
C946	CAPACITOR MET/P 100nF 250V 10%	CM105NK6
C947	CAPACITOR CER.10nF 2KV -20+80%	CD104YP7

DIODES

Component	Description	Part Number
D1	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D2	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D3	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D4	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D6	DIODE BA157	DF0157UU0
D7	DIODE FAST RECOVERY BYV96E	DF0096UU0
D8	DIODE IN4148 UNIVERSAL	DS4148UU0
D10	DIODE IN4148 UNIVERSAL	DS4148UU0
D11	DIODE IN4148 UNIVERSAL	DS4148UU0
D12	DIODE IN4148 UNIVERSAL	DS4148UU0
D13	DIODE IN4148 UNIVERSAL	DS4148UU0
D14	DIODE IN4148 UNIVERSAL	DS4148UU0
D15	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D16	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D17	DIODE BA159 UNIVERSAL	DF0159UU0
D18	DIODE BZY88B7V5 2%	DZ88750FB0
D20	DIODE ZENER BZX79B33V 2%	DZ79331FB0
D21	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D22	DIODE BA159 UNIVERSAL	DF0159UU0
D23	DIODE FAST RECOVERY BYV96E	DF0096UU0
D24	DIODE BA157	DF0157UU0
D25	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D107	DIODE IN4148 UNIVERSAL	DS4148UU0
D117	DIODE ZENER BZX79B12V 2%	DZ79121FB0
D118	DIODE ZENER BZX79B5V6 2%	DZ79560FB0
D201	DIODE BA157	DF0157UU0
D202	DIODE BA159 UNIVERSAL	DF0159UU0
D203	DIODE IN4148 UNIVERSAL	DS4148UU0
D301	DIODE IN4148 UNIVERSAL	DS4148UU0
D302	DIODE IN4007 UNIVERSAL PT. NO.	DP4007UU0
D501	DIODE ZENER BZX61C5V1 1W.5%	DZ61510JC0
D901	DIODE IN4148 UNIVERSAL	DS4148UU0
D902	DIODE IN4148 UNIVERSAL	DS4148UU0
D903	DIODE IN4148 UNIVERSAL	DS4148UU0
D904	DIODE IN4148 UNIVERSAL	DS4148UU0

Component	Description	Part Number
D905	DIODE IN4148 UNIVERSAL	DS4148UU0
D907	DIODE IN4148 UNIVERSAL	DS4148UU0
D908	DIODE BAV20 UNIVERSAL	DS0020UU0
D910	DIODE ZENER BZX79B5V1 2%	DZ79510FB0
D911	DIODE IN4148 UNIVERSAL	DS4148UU0
D912	DIODE BAV20 UNIVERSAL	DS0020UU0
D913	DIODE IN4148 UNIVERSAL	DS4148UU0
D914	DIODE BAV20 UNIVERSAL	DS0020UU0
D920	RESISTOR C/F 12K 1/4W 5% 01	RF124DJ0

FUSES

Component	Description	Part Number
F1	FUSE 5x20mm T2A ANTISURGE ***	KA2001BA0
F1	T 2A FUSEHOLDER L222/K ***	KS0003Y01
F3	FUSE 5 x 20mm F1A FAST BLOW ***	KA1001BQ0
F3	1A FUSEHOLDER L222/K ***	KS0003Y01

INTEGRATED CIRCUITS

Component	Description	Part Number
IC1	HEATSINK V6-2L 01	HH0003HA0
IC1	RIVSCREW AVDEL 1712-3509	HR0003VJ0
IC1	CIRCUIT INT 78M12 +12V	IV7812MU3
IC201	CIRCUIT INT TDA1180P UNIVERSAL	IL1180PU2
IC301	CIRCUIT INT TDA11705 UNIVERSAL	IL1170SU2
IC501	CIRCUIT INT. TBA820M UNIVERSAL	IL0820UU2
IC901	CIRCUIT INT. LM1203	IL1203UN2
IC902	CIRCUIT INT. 74HC86	IT7486GU2
IC903	PINS 5-6 & 12-13 WIRE TINNED COPPER 22SWG.	Z#0226

INDUCTORS

Component	Description	Part Number
L1	COIL DEGAUSS 14INCH 240V ***	LD002KA6
L2	CHOKE 10uH	LW104UA7
L201	CHOKE 15uH B78108-T1153-K	LW154SK2
L202	COIL WIDTH	LV001UA5
L203	COIL LINEARITY PHILIPS	LN005UA6
L501	CHOKE 47uH B78108-S1473-J	LW474SJ2
L901 to L906	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
L908	CHOKE 10uH B78108-S1103-X	LW104SK1
L911	CHOKE 120uH 5% AXIAL	LW125SJ1
L912 to L914	LINK WIRE - SIZE 5MM+5MM+5MM	WL2205TU1

LINKS/SHORT CIRCUITS

Component	Description	Part Number
LK2 , LK3	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
LK8 to LK20	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
LK23	WIRE LINK 5mmx14mmx5mm	WL2214TU1
LK24 to LK30	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
LK904 to LK908	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
LK911 , LK912	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
LK914 to LK918	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
LK921 to LK925	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
LK929	LINK WIRE - SIZE 5MM+5MM+5MM	WL2205TU1
LK940 , LK941	ZEROHM SHORT CIRCUIT LINK	WL6300TU1

PLUGS

Component	Description	Part Number
PL1	PLUG 6 WAY 320/3766 GREY	KP0300D06
PL2	PLUG PCB LOCK 3 WAY B OUT	KP0025A03
PL3	PLUG 5 WAY 320/3765 -2-4 PINS	KP0300D05
PL401 PINS 1-5	PLUG 5W. MOLEX 7395 22-05-7058	KP7395B05
PL404	PLUG 3W. MOLEX 7395 22-05-7038	KP7395B03

Component	Description	Part Number
PL405	SOCKET JACK 3.5mm STEREO PCB	KS5157Y03
PL501	PLUG PCB LOCK 3 WAY	KP0026Y03
PL502	PLUG PCB LOCK 2 WAY	KP0025A02
PL901	PLUG PCB LOCK 10 WAY	KP0026A10
PL902	PLUG PCB LOCK 12 WAY	KP0026A12
PL903	PLUG PCB LOCK 8 WAY	KP0025A08

RESISTORS

Component	Description	Part Number
R2	RESISTOR M/FILM 180K 2W 5%	RM185LJ0
R3	RESISTOR M/FILM 3K9 0.25W 1%	RM393DH0
R5	RESISTOR M/FILM 10K 1/4W 1%	RM104DH0
R6	RESISTOR W/W 15K 7W 308-3 VTM	RW154VJ8
R7	RESISTOR C/F 47R 1/4W 5% 02	RF471DJ0
R8	RESISTOR M/FILM 22K 0.75W 2%	RM224II0
R10	RESISTOR C/F 390R 1/4W 5% 02	RF392DJ0
R11	RESISTOR C/F 22R 1/4W 5% 01	RF221DJ0
R12	RESISTOR W/W 1K0 7W VTM 308-3	RW103VJ8
R13	RESISTOR C/F 27K 1/4W 5% 01	RF274DJ0
R14	RESISTOR C/F 100R 1/4W 5% 01	RF102DJ0
R15	RESISTOR MET/O 1R5 2W 5% 01	R0150LJ0
R16	RESISTOR W/W 1K0 7W VTM 308-3	RW103VJ8
R17	RESISTOR MET/G 3M3 1/2W 5% ***	RG336GJ0
R21	RESISTOR C/F 390R 1/4W 5% 02	RF392DJ0
R22	RESISTOR C/F 680R 1/4W 5% 01	RF682DJ0
R23	RESISTOR C/F 4K7 1/4W 5% 03	RF473DJ0
R24	RESISTOR C/F 22K 1/4W 5% 02	RF224DJ0
R25	RESISTOR MET/O 4R7 2W 5% 01	R0470LJ0
R26	RESISTOR FUS/F 4R7 1/2W 5% ***	RL470GJ0
R27	RESISTOR C/F 120K 1/4W 5% 01	RF125DJ0
R29	RESISTOR C/F 180K 1/4W 5% 01	RF185DJ0
R30	RESISTOR W/W 1K0 7W VTM 308-3	RW103VJ8
R31	RESISTOR M/FILM 22K 0.75W 2%	RM224II0
R118	RESISTOR C/F 330R 1/4W 5%	RF332DJ0
R120	RESISTOR C/F 2K7 1/4W 5% 02	RF273DJ0
R124	RESISTOR C/F 470R 1/4W 5% 08	RF472DJ0
R125	RESISTOR C/F 1K5 1/4W 5% 05	RF153DJ0

14M325MA2C COMPONENTS LIST

Component	Description	Part Number
R126	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R135	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R136	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R137	RESISTOR C/F 100K 1/4W 5% 01	RF105DJ0
R140	RESISTOR C/F 47K 1/4W 5% 03	RF474DJ0
R141	RESISTOR C/F 2K7 1/4W 5% 02	RF273DJ0
R201	RESISTOR C/F 2K7 1/4W 5% 02	RF273DJ0
R202	RESISTOR C/F 2K2 1/4W 5% 07	RF223DJ0
R203	RESISTOR C/F 6M8 1/4W 5% 01	RF686DJ0
R204	RESISTOR C/F 1M5 1/4W 5% 01	RF156DJ0
R205	RESISTOR C/F 2M2 1/4W 5% 01	RF226DJ0
R206	RESISTOR C/F 39K 1/2W 5% 03	RF394GJ0
R208	RESISTOR C/F 10R 1/4W 5% 01	RF101DJ0
R210	RESISTOR C/F 820K 1/4W 5% 01	RF825DJ0
R211	RESISTOR C/F 1K2 1/4W 5% 01	RF123DJ0
R212	RESISTOR C/F 3K6 1/4W 5% 02	RF363DJ0
R213	RESISTOR C/F 100K 1/4W 5% 01	RF105DJ0
R214	RESISTOR C/F 220K 1/2W 5% 01	RF225GJ0
R215	RESISTOR C/FILM 9K1 1/4 W	RF913DJ0
R216	RESISTOR C/F 82K 1/4W 5% 01	RF824DJ0
R217	RESISTOR C/F 22K 1/4W 5% 02	RF224DJ0
R221	RESISTOR C/F 100K 1/4W 5% 01	RF105DJ0
R222	RESISTOR C/F 150K 1/4W 5% 02	RF155DJ0
R223	RESISTOR C/F 100R 1/4W 5% 01	RF102DJ0
R224	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R225	RESISTOR C/F 330R 1/2W +/- 5%%	RF332GJ0
R226	RESISTOR FUS/F 4R7 1/2W 5% ***	RL470GJ0
R227	RESISTOR MET/O 1R0 1W 5% 01	R0100JJ0
R228	RESISTOR C/F 1K0 1/2W 5%	RF103GJ0
R230	RESISTOR C/F 330R 1/2W +/- 5%%	RF332GJ0
R231	TAG SUPPORT FOR WW RES 04	HM0001RS0
R231	RESIST W/W FUS.15R 5.5W 5% ***	RX151SJ6
R232	RESISTOR C/F 27R 1/2W +/- 5%	RF271GJ0
R233	RESISTOR C/F 39K 1/2W 5% 03	RF394GJ0
R234	RESISTOR C/F 39K 1/2W 5% 03	RF394GJ0
R235	RESISTOR FUS/F 4R7 1/2W 5% ***	RL470GJ0
R237	RESISTOR M/FILM 0.47R 1/4W 5%	RM047DJ0
R301	RESISTOR C/F 680K 1/4W 5% 02	RF685DJ0
R302	RESISTOR C/F 12K 1/4W 5% 01	RF124DJ0

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Component	Description	Part Number
R303	RESISTOR C/F 470K 1/4W 5% 03	RF475DJ0
R304	RESISTOR C/F 470K 1/4W 5% 03	RF475DJ0
R305	RESISTOR C/F 680K 1/4W 5% 02	RF685DJ0
R308	RESISTOR C/F 50K 1/4W 5% 02	RF155DJ0
R310	RESISTOR C/F 1K8 1/4W 5% 04	RF183DJ0
R311	RESISTOR C/F 5K6 1/4W 5% 02	RF563DJ0
R313	RESISTOR C/F 47K 1/4W 5% 03	RF474DJ0
R314	RESISTOR C/F 47K 1/4W 5% 03	RF474DJ0
R315	RESISTOR C/F 220K 1/4W 5% 02	RF225DJ0
R316	RESISTOR C/F 18K 1/4W 5% 02	RF184DJ0
R317	RESISTOR C/F 5K6 1/4W 5% 02	RF563DJ0
R318	RESISTOR C/F 18K 1/4W 5% 02	RF184DJ0
R320	RESISTOR C/F 3R3 1/4W 5% 01	RF330DJ0
R322	RESISTOR M/F 220R 0.75W 2%	RM222II0
R323	RESISTOR C/F 1R0 1/4W 5% 01	RF100DJ0
R329	RESISTOR C/F 33R 1/4W 5% 01	RF331DJ0
R408	RESISTOR C/F 100R 1/4W 5% 01	RF102DJ0
R409	RESISTOR C/F 100R 1/4W 5% 01	RF102DJ0
R501	RESISTOR C/F 1K8 1/4W 5% 04	RF183DJ0
R502	RESISTOR C/F 10K 1/4W 5% 02	RF104DJ0
R503	RESISTOR C/F 150R 1/4W 5%	RF152DJ0
R504	RESISTOR C/F 56R 1/4W 5%	RF561DJ0
R505	RESISTOR C/F 1R0 1/4W 5% 01	RF100DJ0
R506	RES. FUS.M/F 1R0 0.5W 5% ***	RL100GJ0
R901	RESISTOR C/F 75R 1/4W 5% 01	RF751DJ0
R902	RESISTOR C/F 75R 1/4W 5% 01	RF751DJ0
R903	RESISTOR C/F 75R 1/4W 5% 01	RF751DJ0
R904	RESISTOR C/F 10K 1/4W 5% 02	RF104DJ0
R905	RESISTOR C/F 10K 1/4W 5% 02	RF104DJ0
R906	RESISTOR C/F 10K 1/4W 5% 02	RF104DJ0
R907	RESISTOR M/F 1K5 1/4W 1%	RM153DH0
R909	RESISTOR C/F 3K3 1/4W 5%	RF333DJ0
R911	RESISTOR C/F 10K 1/4W 5% 02	RF104DJ0
R912	RESISTOR M/F 39K 0.25W 1%	RM394DH0
R913	RESISTOR C/F 470R 1/4W 5% 08	RF472DJ0
R919	RESISTOR M/FILM 4K7 1% 1/4W	RM473DH0
R921	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
R922	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
R926	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0

Component	Description	Part Number
R927	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R929	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R930	RESISTOR C/F 220K 1/4W 5% 02	RF225DJ0
R931	RESISTOR C/F 330R 1/4W 5%	RF332DJ0
R932	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
R933	ZEROHM SHORT CIRCUIT LINK	WL6300TU1
R934	RESISTOR C/F 330R 1/4W 5%	RF332DJ0
R935	RESISTOR FUS/F 2R2 1/4W 5% ***	RL220DJ0
R937	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R938	RESISTOR C/F 470R 1/4W 5% 08	RF472DJ0
R941	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R942	RESISTOR M/F 47K 0.25W 1%	RM474DH0
R943	RESISTOR C/F 390R 1/4W 5% 02	RF392DJ0
R944	RESISTOR C/F 390R 1/4W 5% 02	RF392DJ0
R945	RESISTOR C/F 390R 1/4W 5% 02	RF392DJ0
R946	RESISTOR M/FILM 4K7 1% 1/4W	RM473DH0
R947	RESISTOR C/F 3K3 1W 5% 01	RF333JJ0
R948	RESISTOR C.COMP. 220R 1/2W 03	RK222GK0
R950	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R951	RESISTOR C/F 47R 1/4W 5% 02	RF471DJ0
R952	RESISTOR C/F 120R 1/4W 5% 01	RF122DJ0
R953	RESISTOR C/F 270R 1/4W 5%	RF272DJ0
R954	RESISTOR C/F 1M0 1/4W 5% 03	RF106DJ0
R955	RESISTOR C/F 82K 1/4W 5% 01	RF824DJ0
R956	RESISTOR M/FUS 100R 1/4W 5%***	RL102DJ0
R957	RESISTOR C/F 3K3 1W 5% 01	RF333JJ0
R958	RESISTOR C.COMP. 220R 1/2W 03	RK222GK0
R960	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R961	RESISTOR C/F 47R 1/4W 5% 02	RF471DJ0
R962	RESISTOR C/F 120R 1/4W 5% 01	RF122DJ0
R963	RESISTOR C/F 270R 1/4W 5%	RF272DJ0
R964	RESISTOR C/F 1M0 1/4W 5% 03	RF106DJ0
R965	RESISTOR C/F 82K 1/4W 5% 01	RF824DJ0
R966	RESISTOR M/FUS 100R 1/4W 5%***	RL102DJ0
R967	RESISTOR C/F 3K3 1W 5% 01	RF333JJ0
R968	RESISTOR C.COMP. 220R 1/2W 03	RK222GK0
R970	RESISTOR C/F 1K0 1/4W 5% 05	RF103DJ0
R971	RESISTOR C/F 47R 1/4W 5% 02	RF471DJ0
R972	RESISTOR C/F 120R 1/4W 5% 01	RF122DJ0

Component	Description	Part Number
R973	RESISTOR C/F 270R 1/4W 5%	RF272DJ0
R974	RESISTOR C/F 1M0 1/4W 5% 03	RF106DJ0
R975	RESISTOR C/F 82K 1/4W 5% 01	RF824DJ0
R976	RESISTOR M/FUS 100R 1/4W 5%***	RL102DJ0
R978	RESISTOR C/C 100K 1/2W 10% 02	RK105GK0
RL907	ZEROHM SHORT CIRCUIT LINK	WL6300TU1

TRANSFORMERS

Component	Description	Part Number
T1	FILTER CHOKE PC6522	L01289I01
T2	TRANSFORMER[240V] SMPS ***	TI0004I06
T201	TRANSFORMER LINE DRIVER	T02134I01
T203	TRANSFORMER DIODE SPLIT-S.3***	T01930I04
TL106 POS. 1	WIRE TINNED COPPER 22SWG.	Z#0226

TRANSISTORS

Component	Description	Part Number
TR1	TRANSISTOR BC307-5	QS0307UU5
TR2	TRANSISTOR TIPL753A [R3213]	QP0753UX0
TR2	WASHER M3 INT SHKPRF PLT07	HW3000BA0
TR2	NUT M3 FULL HEX.PLATED	HN0300HA0
TR102	TRANSISTOR 2N4123	QS4123UU0
TR106	TRANSISTOR BC337-RL1	QS0337UU0
TR201	TRANSISTOR ZTX652	QS0652UU0
TR202	TRANSISTOR BU508DFI	QQ5080DS0
TR302	TRANSISTOR BC337-RL1	QS0337UU0
TR901	TRANSISTOR ZTX750	QS0750KF6
TR902	TRANSISTOR BF585	QS0585UL0
TR903	TRANSISTOR BC237P	QS0237UU0
TR904	TRANSISTOR MPSA92 PNP.	QS0092UU5
TR905	TRANSISTOR BF585	QS0585UL0
TR906	TRANSISTOR BC237P	QS0237UU0
TR907	TRANSISTOR MPSA92 PNP.	QS0092UU5
TR908	TRANSISTOR BF585	QS0585UL0

Component	Description	Part Number
TR909	TRANSISTOR BC237P	QS0237UU0
TR910	TRANSISTOR MPSA92 PNP.	QS0092UU5
TR303	TRANSISTOR BC307-5	QS0307UU5

THYRISTORS

Component	Description	Part Number
TY1	THYRISTOR 30-100V 0.8A FAST	QY0102UU0
TY2	FIT REVERSED THYRISTOR X0102DA	QY0102DC0

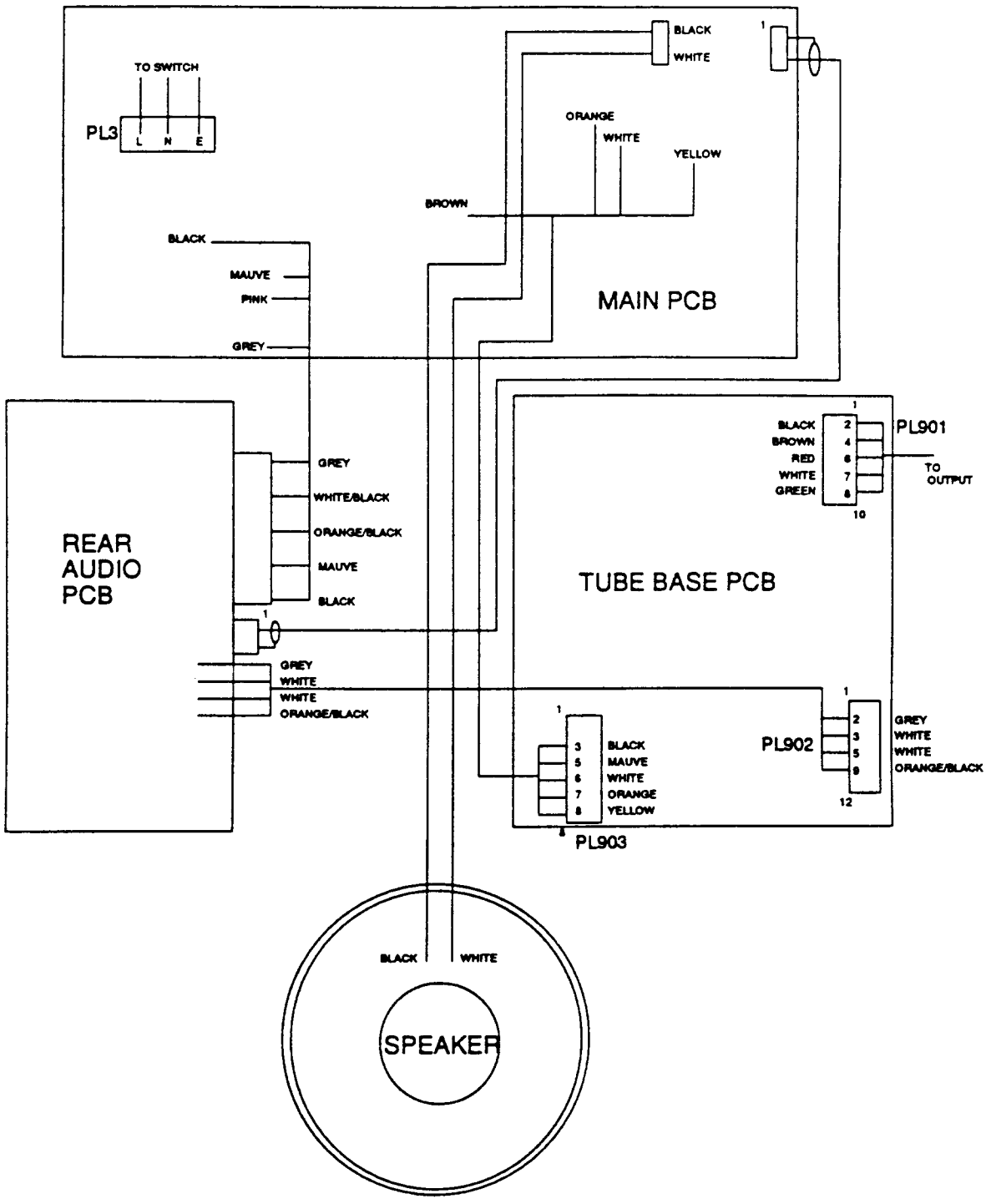
VARIABLE RESISTORS

Component	Description	Part Number
VR4	POT.PRESET 1K0 0.1W 20% HZ 04	RQ103AL2
VR218	POT.PRESET 22K 0.1W 20% VT 01	RQ224AL1
VR220	POT.PRESET 220K 0.1W 20% VT 01	RQ225AL1
VR306	POT.PRESET 470K 0.1W 20% VT 01	RQ475AL1
VR307	POT.PRESET 100K 0.1W 20% VT 02	RQ105AL1
VR312	POT.PRESET 100K 0.1W 20% VT 02	RQ105AL1
VR321	POT PRESET 10K 0.1W 20% HZ	RQ104AL2
VR401	POT CONT 10KA LIN CTR INDENT	RV104DV16
VR402	POT CONT 10KA LIN CTR INDENT	RV104DV16
VR403	POT CONTROL 2K2B LOG	RV223DV1
VR901	POT PRESET 220R VERTICAL	RQ222AL1
VR902	POT PRESET 220R VERTICAL	RQ222AL1
VR903	POT PRESET 220R VERTICAL	RQ222AL1
VR904	POT.PRESET 47K 0.1W 20% VERT.	RQ474AL1
VR905	POT.PRESET 47K 0.1W 20% VERT.	RQ474AL1
VR906	POT.PRESET 47K 0.1W 20% VERT.	RQ474AL1

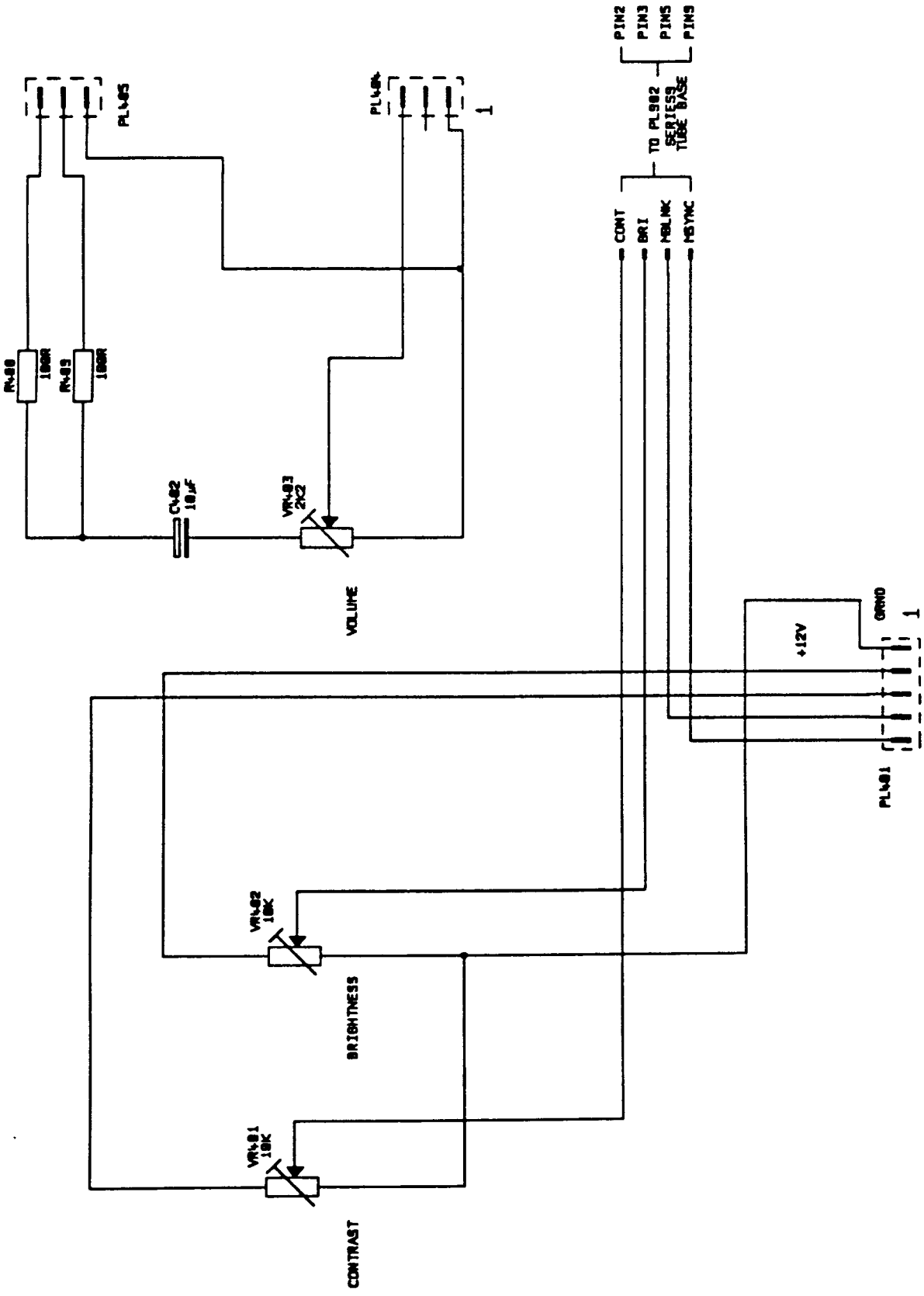
THERMISTORS

Component	Description	Part Number
TH2	THERMISTOR 15OHMS 30% K231	RT003NN0
TH1	THERMISTOR 263100P2332T33301	RT005QN0

ADDITIONAL DIAGRAMS



Interconnection Diagram - 14M325MA2C



Rear Input Panel Circuit Diagram - G02261 - 14M325MA2C

AMENDMENTS

AFFECTS

All metal cabinet monitors.

DESCRIPTION

Modifications to bring cabinet back wire routing, dressing and securing in line with current production practice.

IMPLEMENTATION

These modifications only apply whenever a monitor is returned for service.

MODIFICATIONS

With the cabinet top removed check the following:

Signal Wires On Cabinet Back Components

(DIN sockets, BNC sockets, mode switches, brightness/contrast controls etc).

a) It is now the practice to fit a 'tyrap' fastener onto the signal wires on each component. (See diagrams). A 'tyrap' should be fitted to any component which is found not to have one.

   Note: The signal wires are already mechanically twisted onto each pin and then soldered : this modification provides additional wire attachment.

b) If it is possible to move any of these signal wires away from its normal position to touch the small exposed section of the terminals on the main switch then sufficient 'tyraps' should be fitted to these wires to hold them in position.

   Note: This does not apply to wires which are already contained within a secondary sleeve.

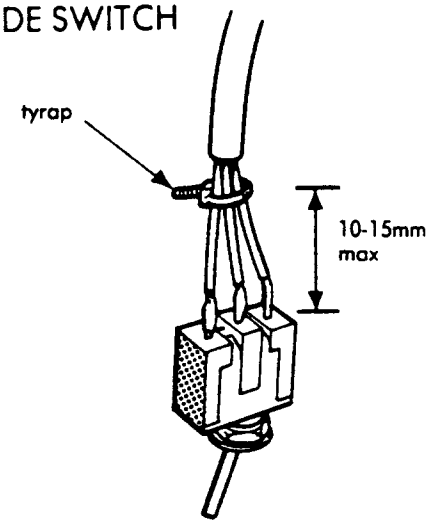
Single Insulated Mains Wires On Mains Switch

This only applies to the short sections of mains cable from which the outer sheath has been removed to allow the individual wires to be attached and soldered to the mains switch.

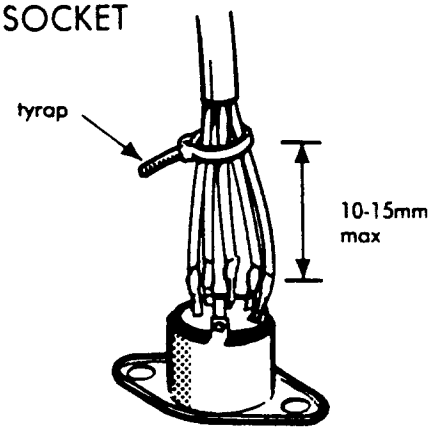
If it is possible to move any of these short sections of wire away from its normal position to touch a pin on one of the cabinet back components then sufficient 'tyraps' should be fitted to the mains wires to hold them in position. (See diagram).

TYRAP POSITIONS ON CABINET BACK COMPONENTS

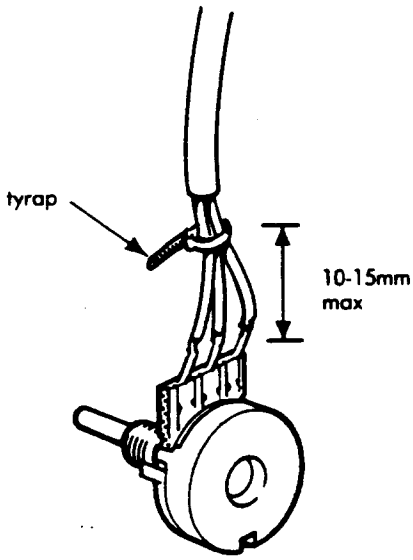
MODE SWITCH



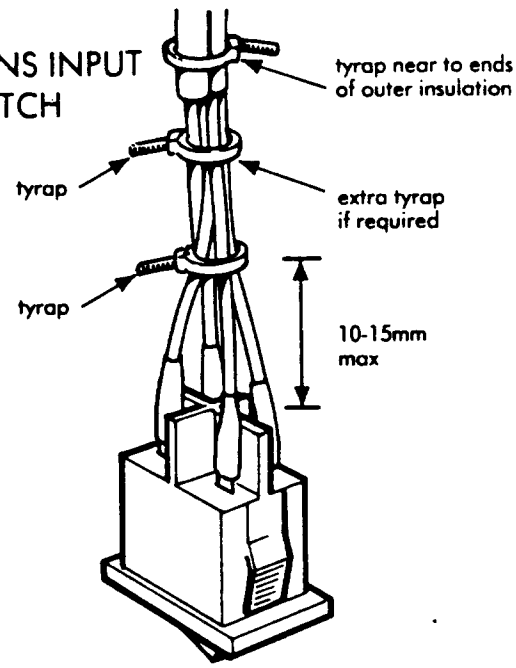
DIN SOCKET



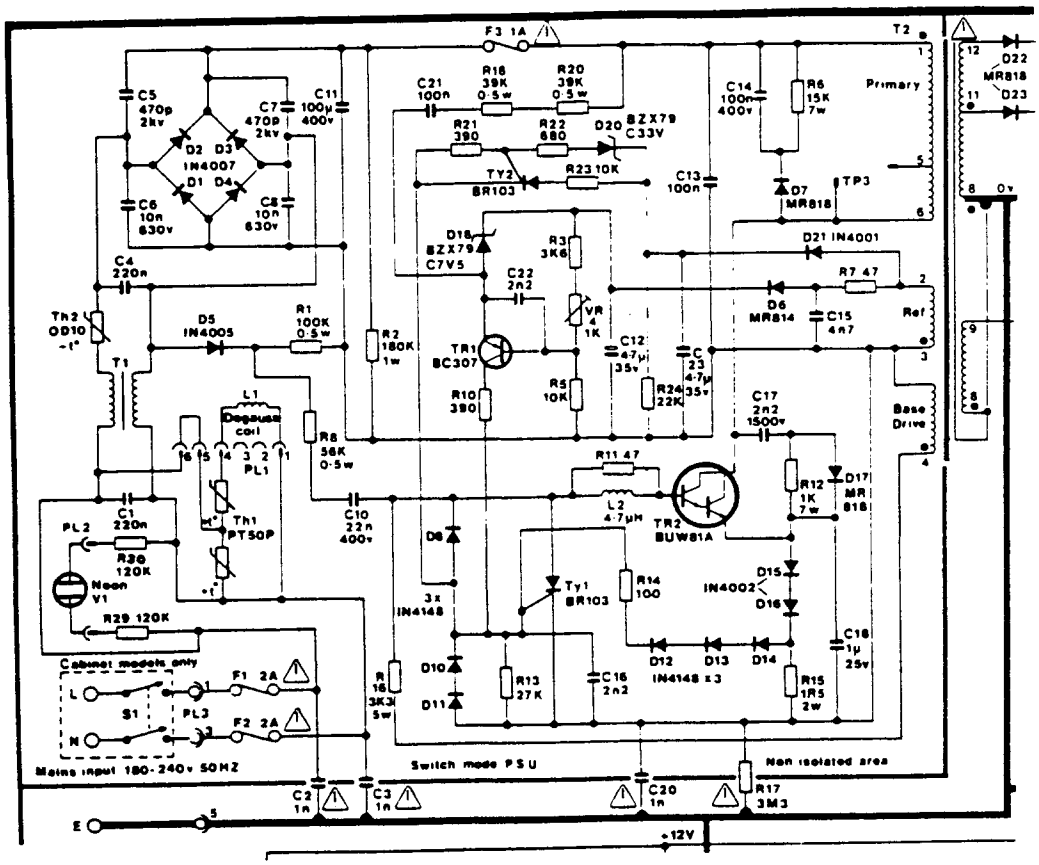
CONTROL



MAINS INPUT SWITCH



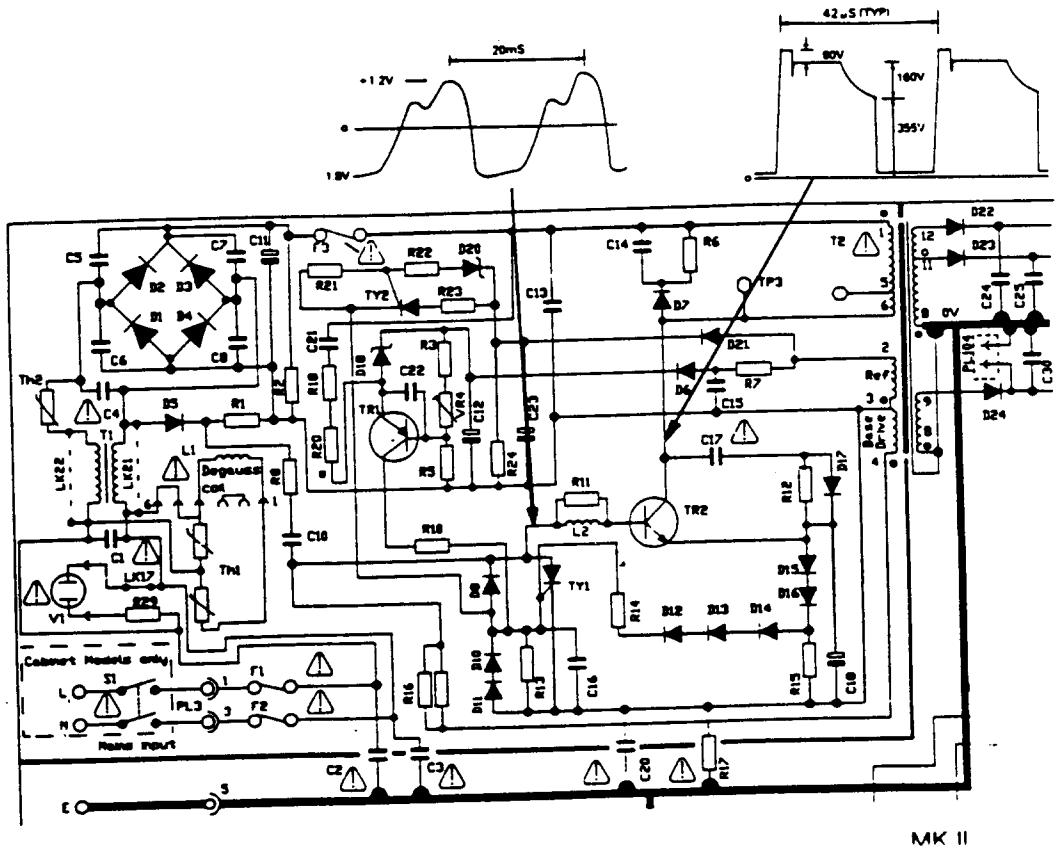
Note: All tyraps to be fully tight



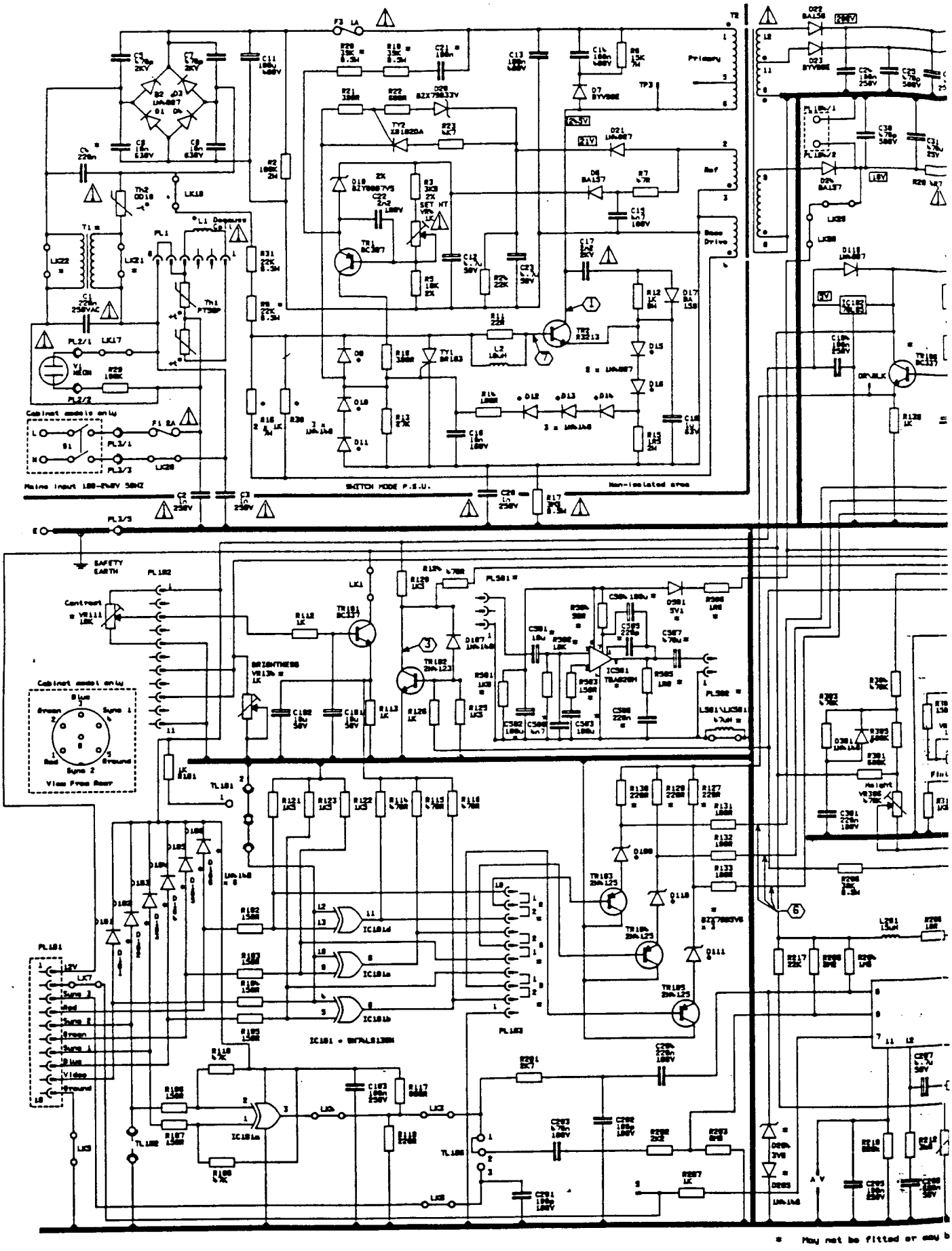
MK I

*NOTE
THE LATEST SERIES 3
POWER SUPPLY DIFFERS
FROM THE PREVIOUS BY
THE FOLLOWING:

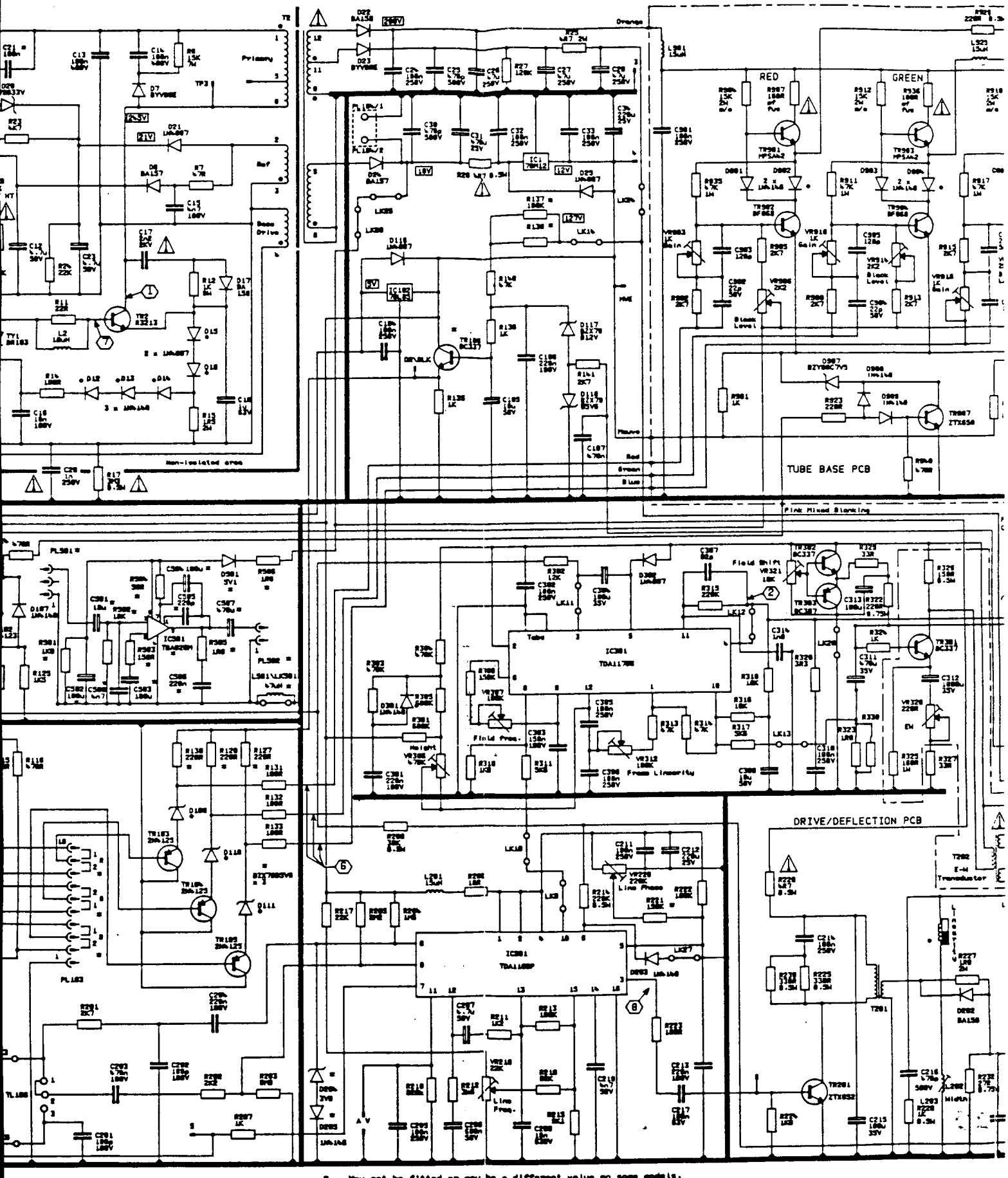
R1 REMOVED
D5 REMOVED AND LINK FITTED
C10 } NOW 22K ½W
R8 } M/FILM RESISTOR



MK II

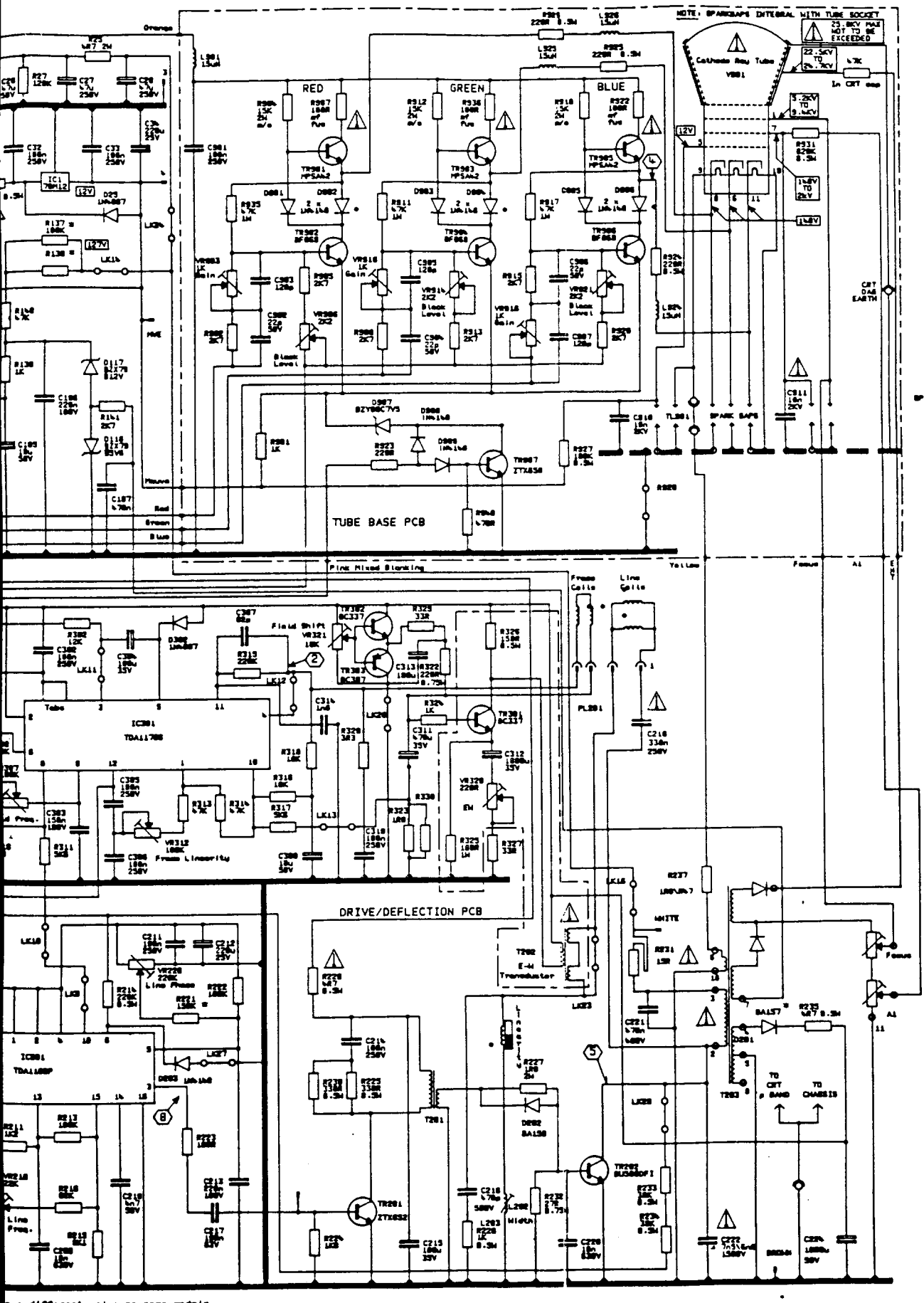


= May not be fitted or may b

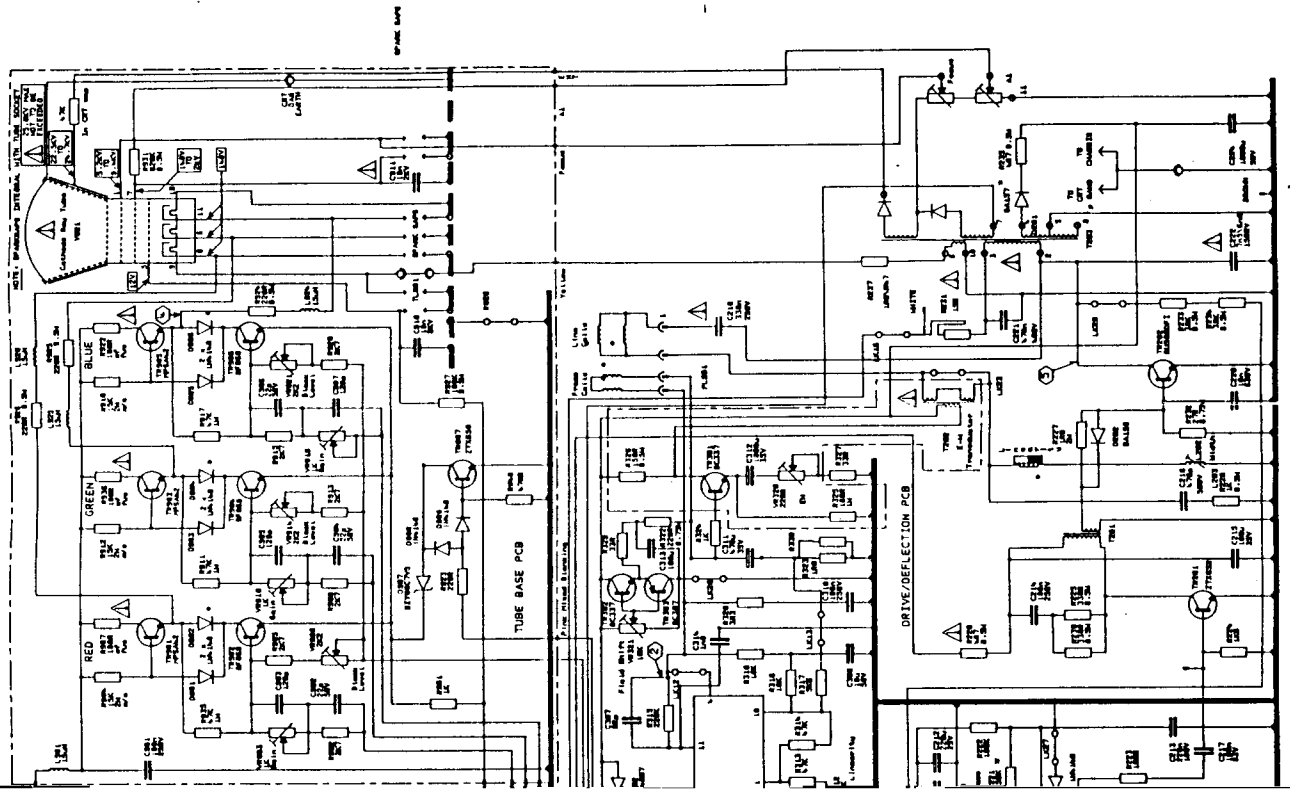


* May not be fitted or may be a different value on some models.

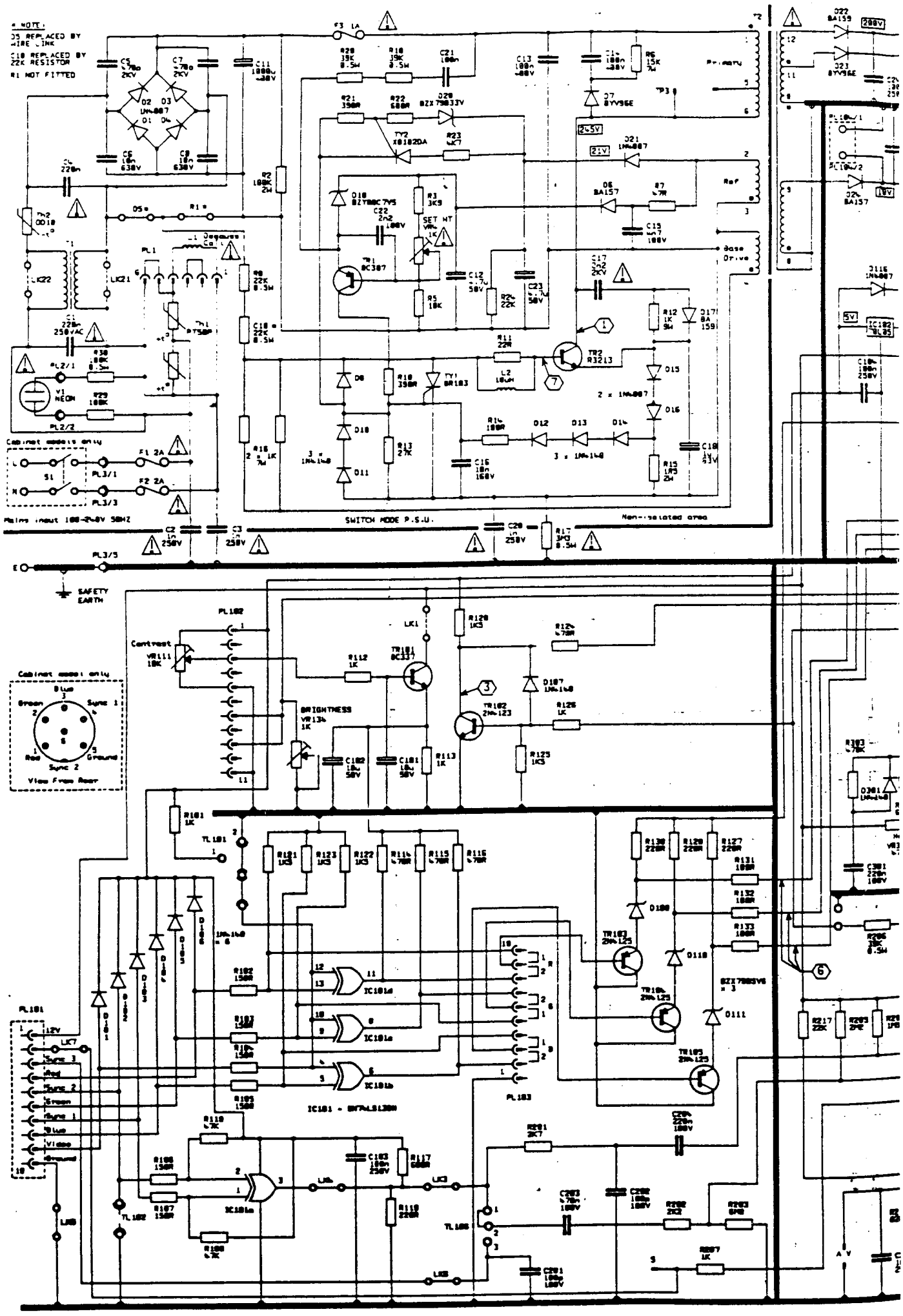
Drive Deflection Circuit Diagram Series 3 C Models - GO0397

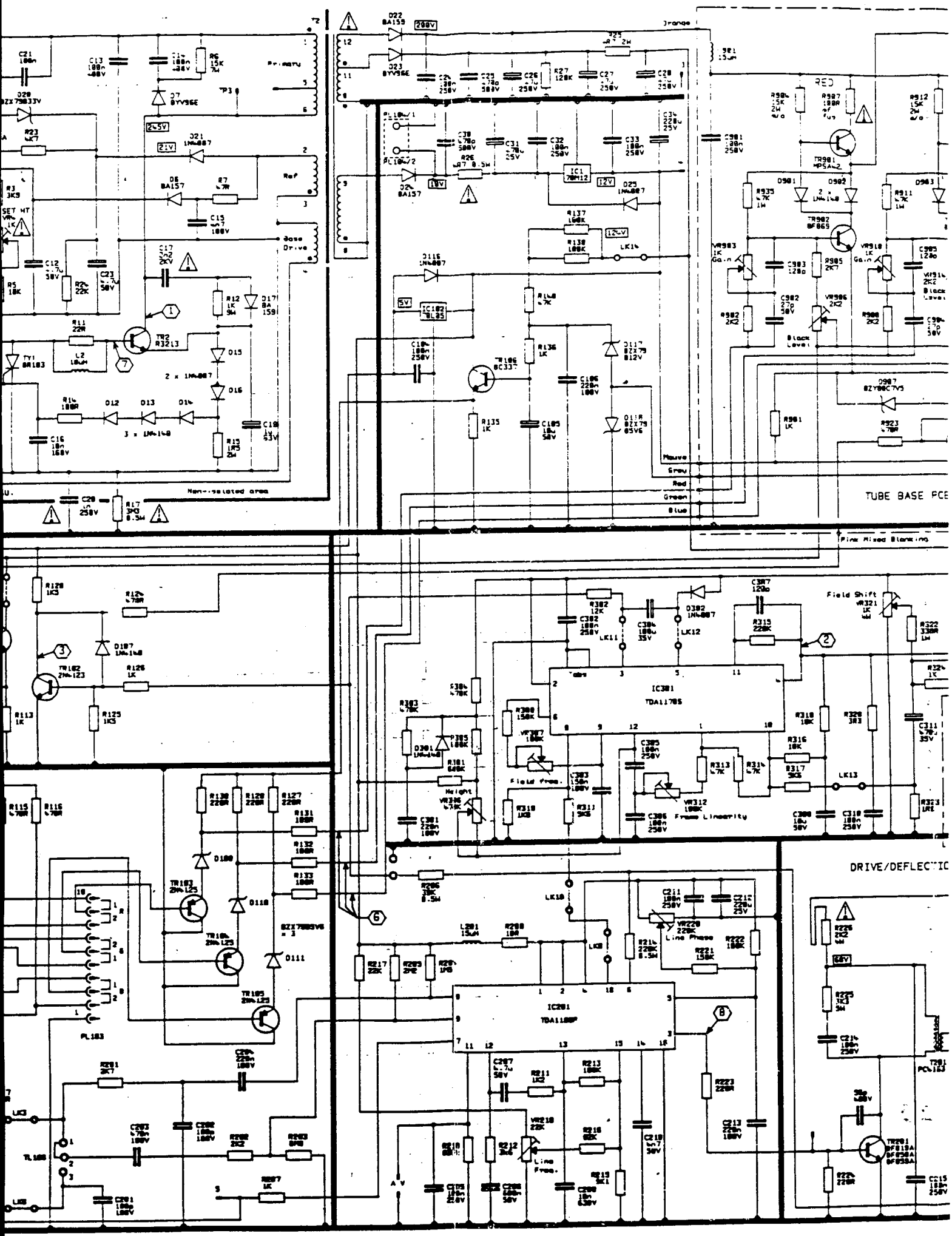


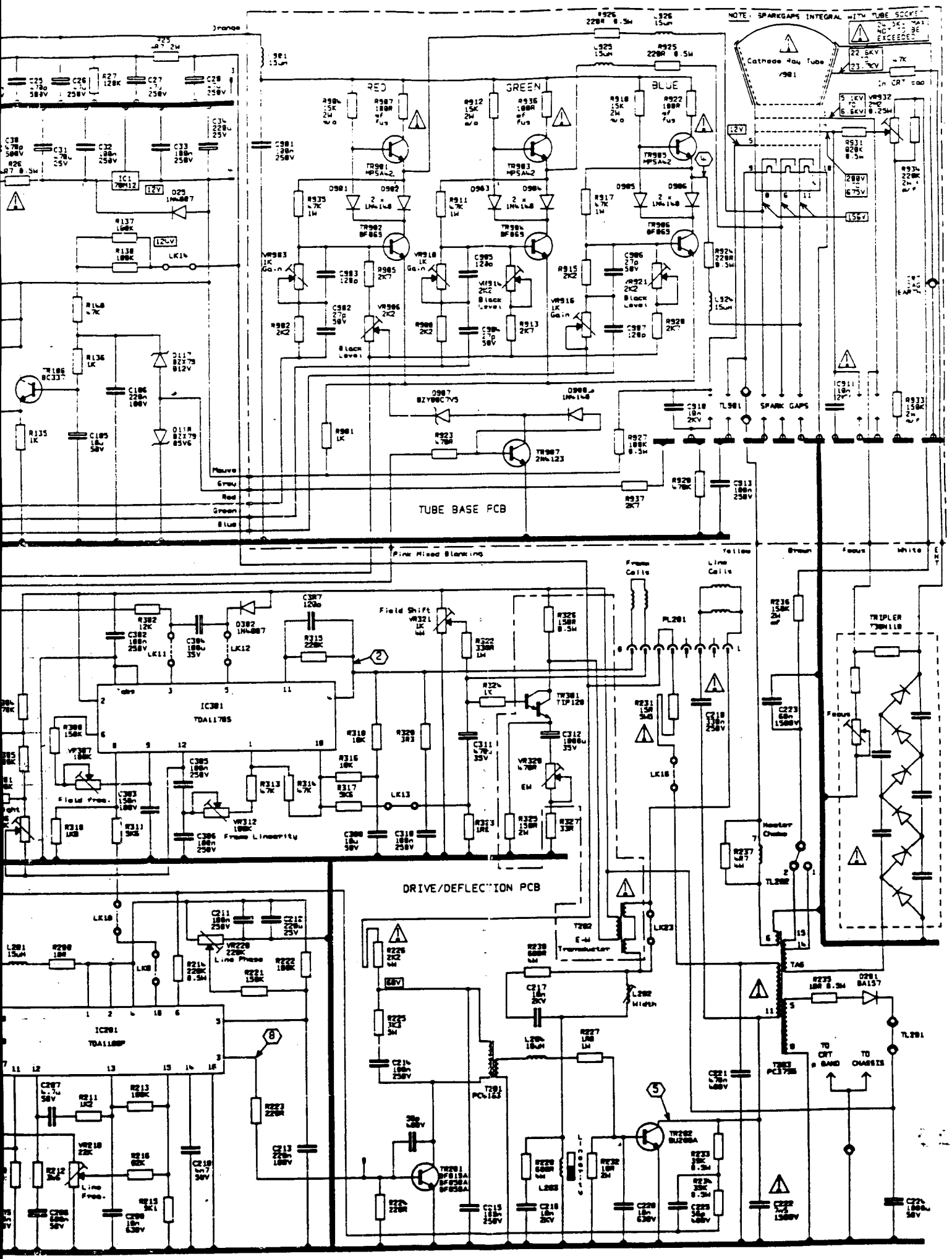
e a different value on some models.

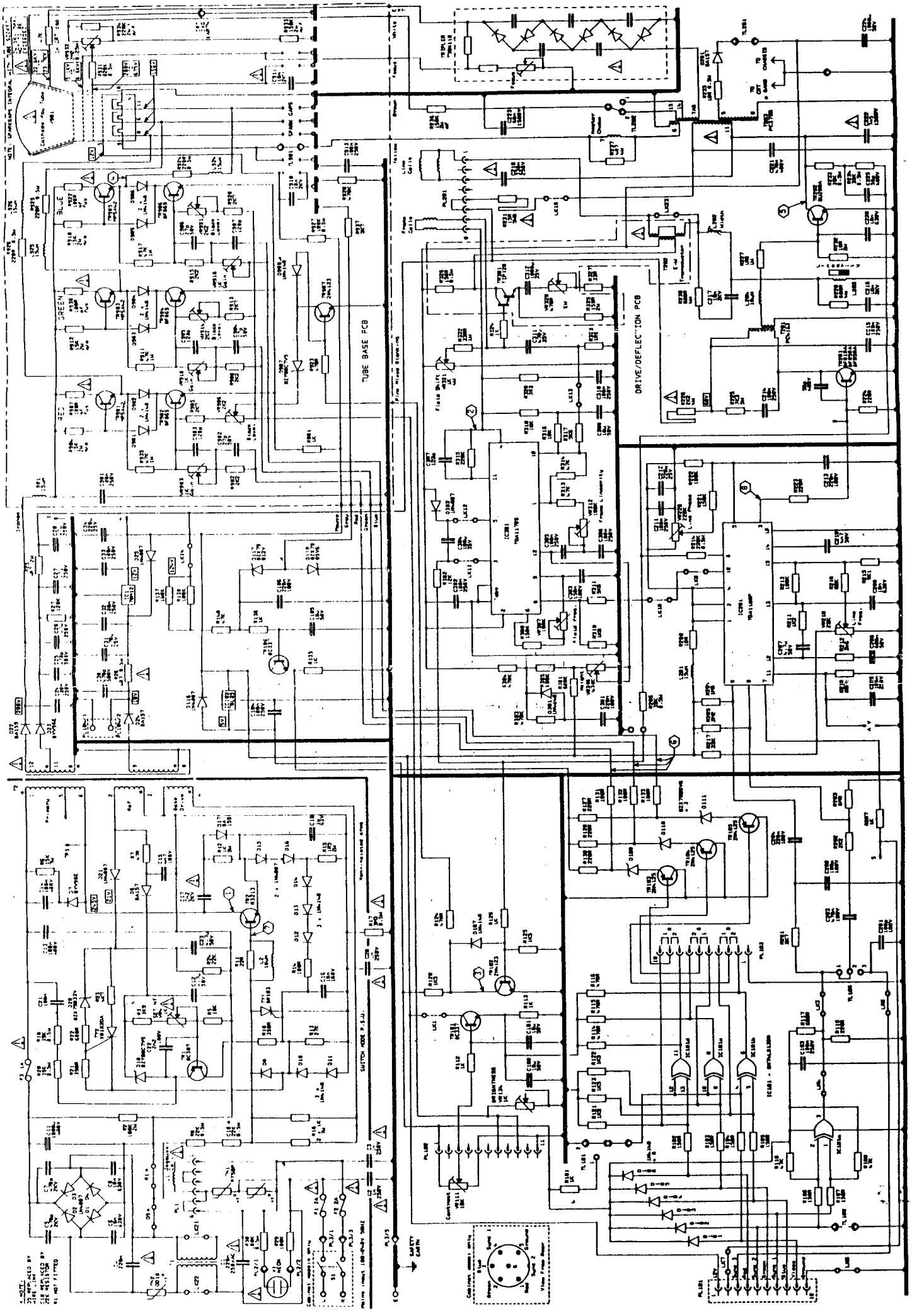


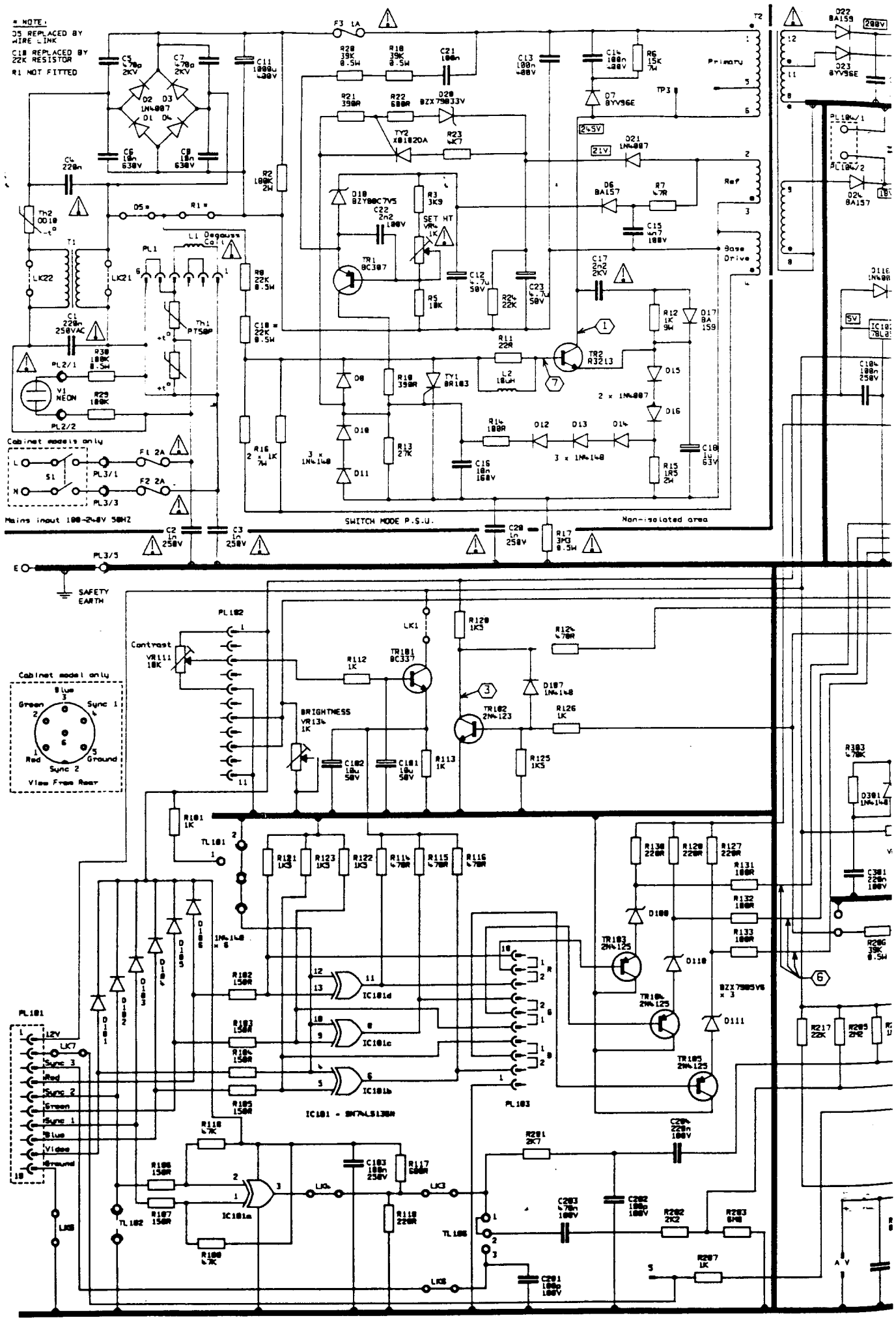
GO0397 - sheet

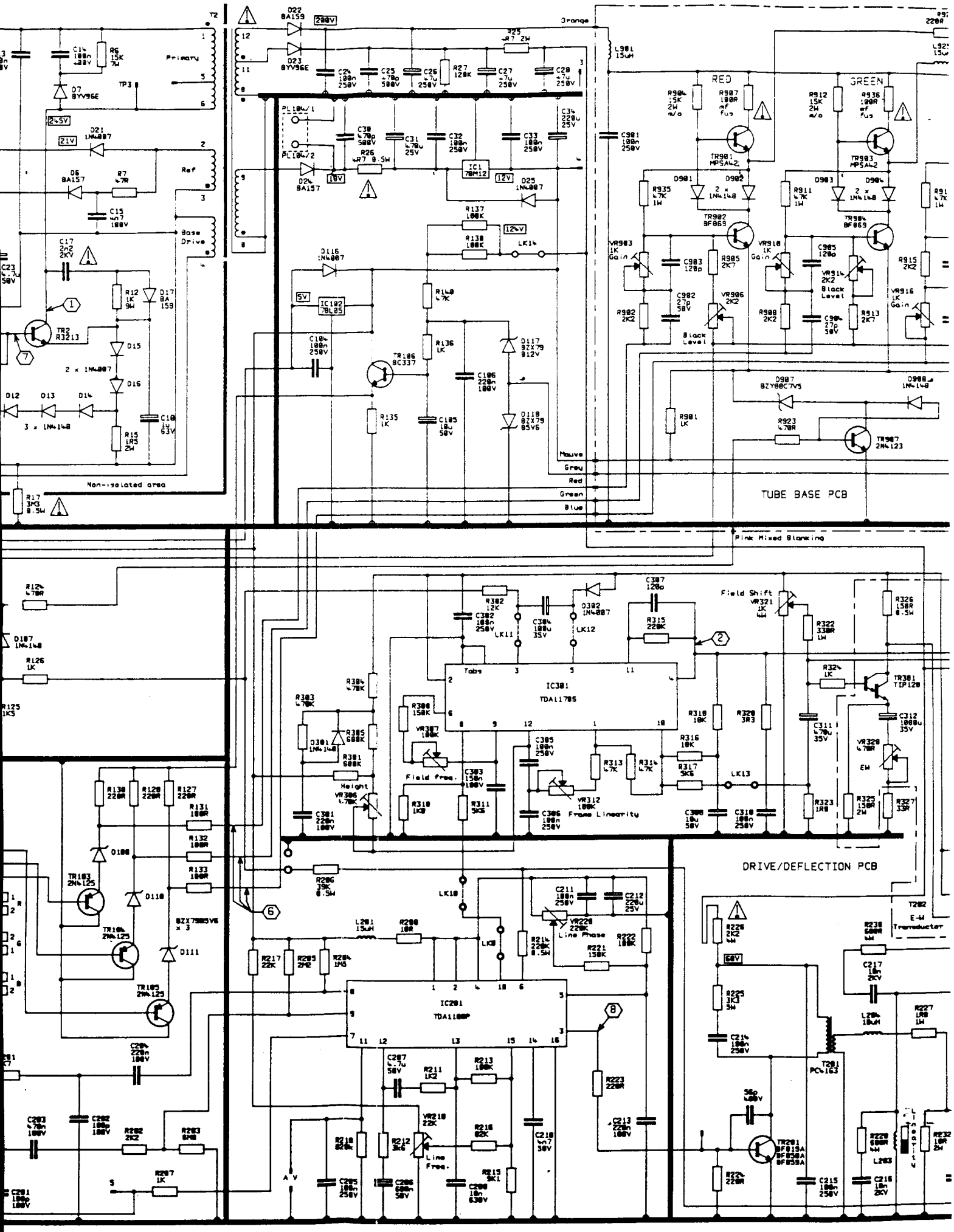

SWITCH MODE P.S.U.
Non-isolated area
SAFETY EARTH
BRIGHTNESS
Contrast
IC101 - 8XPALS138N
View From Rear

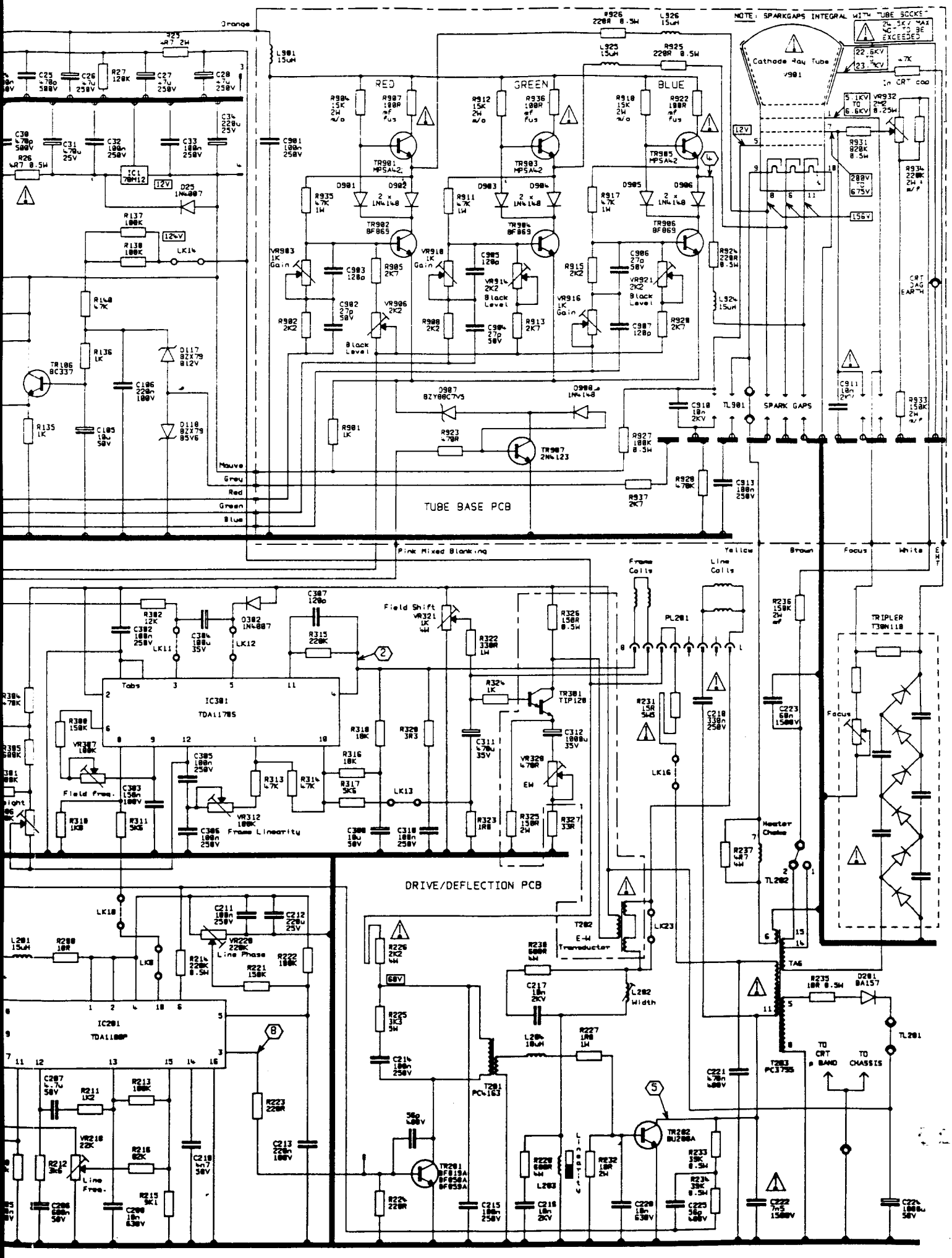

TUBE BASE PCB
DRIVE/DEFLECTION
IC381
TDA1178S
IC201
TDA1180P
Field Shift
Field Freq.
Height
Line Phase
Line Freq.
Line Linearity
Frame Linearity
Black Level
Red
Green
Blue
Mauve
Grey
Primary
Ref
Base Drive
Non-isolated area
Pink Fixed Blanking

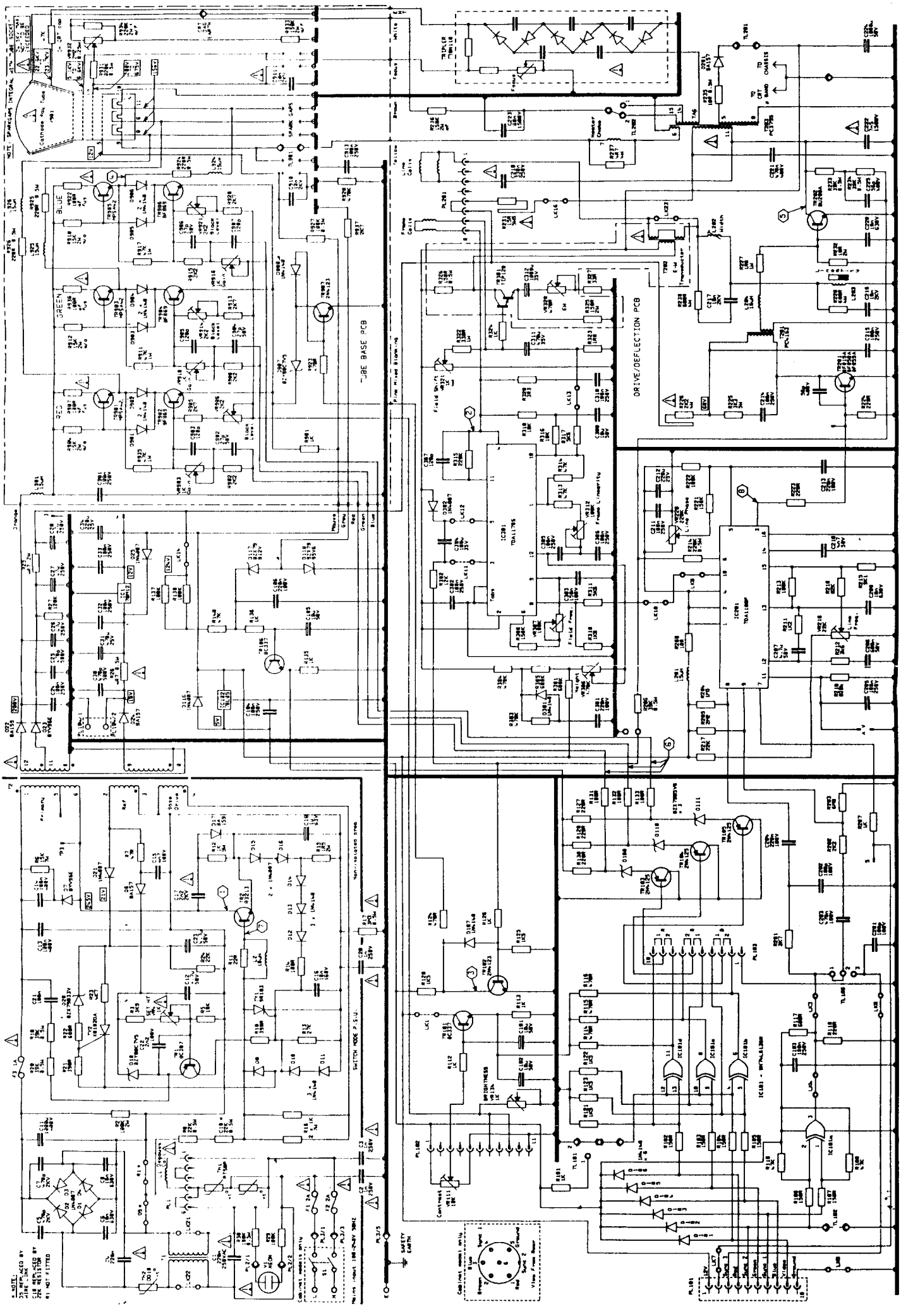

TUBE BASE PCB
DRIVE/DEFLECTION PCB
RED
GREEN
BLUE
SPARK GAPS
TRIPLER
Field Shift
Frame Coils
Line Coils
Focus
Heater Choke
Cathode Ray Tube
Mauve
Grey
Red
Green
Blue
Yellow
Brown
White
Pink Mixed Blanking
IC301
TDA1185
IC201
TDA1180P
Field Freq.
Frame Linearity
Line Phase
Line Freq.
EW
Width
Trapezium
TO CRT & BASE
TO CHASSIS

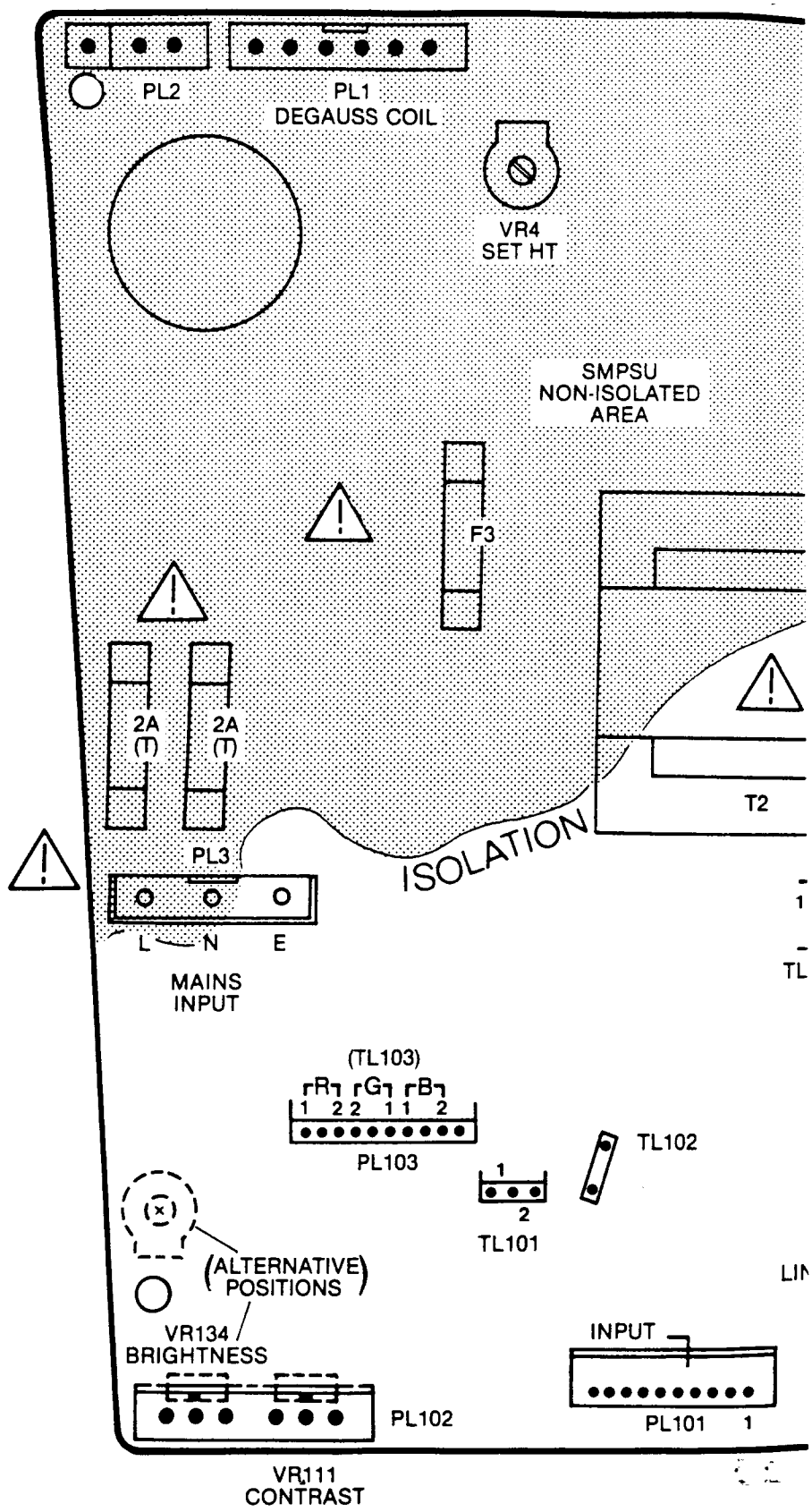

TUBE BASE PCB
DRIVE/DEFLECTION PCB
SWITCH MODE P.S.U.

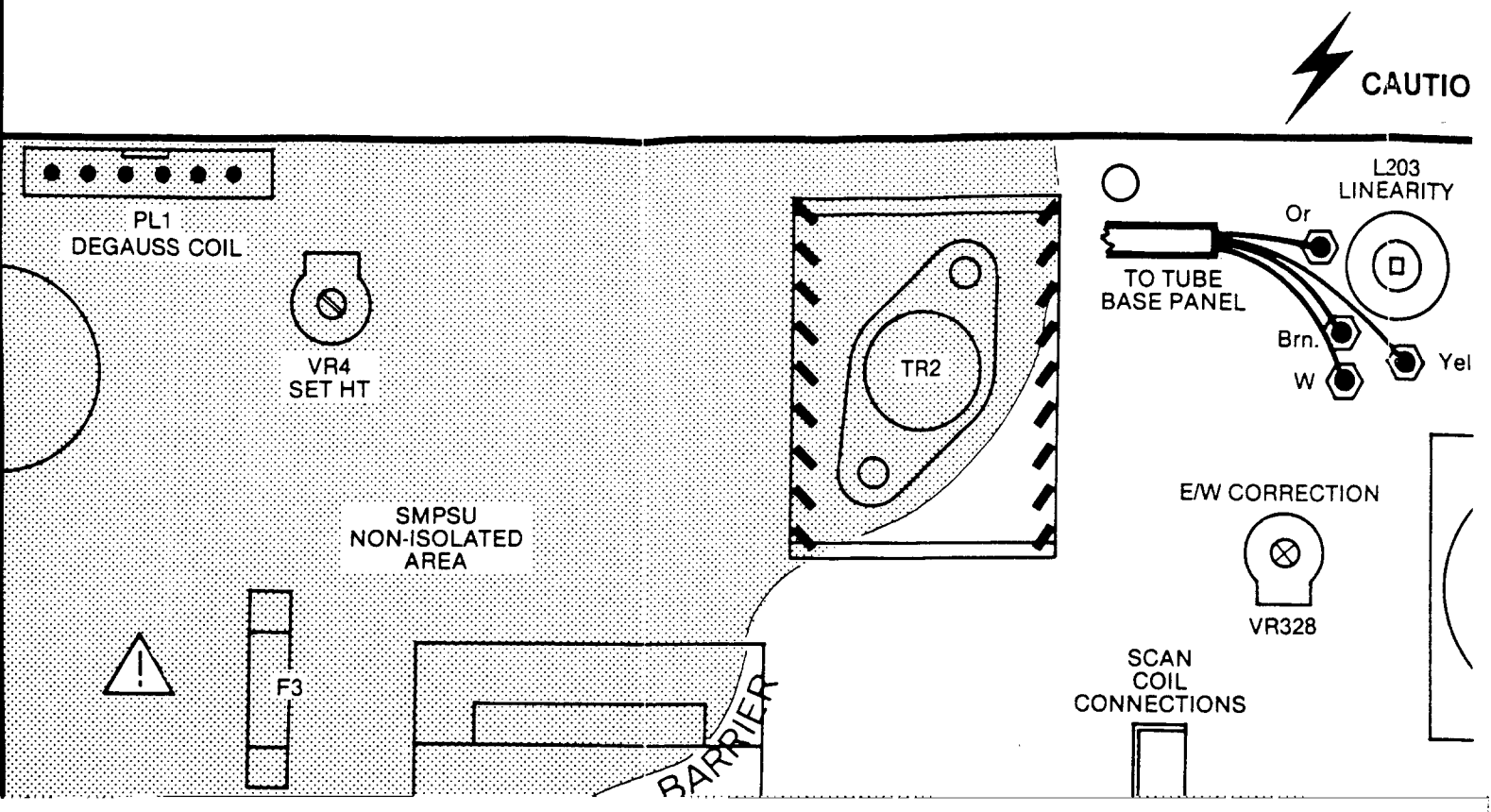

* NOTE:
D5 REPLACED BY WIRE LINK
C18 REPLACED BY 22K RESISTOR
R1 NOT FITTED
SWITCH MODE P.S.U.
Non-isolated area
Mains input 100-240V 50HZ
Cabinet model only
SAFETY EARTH
Contrast
BRIGHTNESS
Blue
Green
Sync 1
Red
Sync 2
Ground
View From Rear
IC101 - SN74LS138N
Sync 3
Video
Primary
Base Drive
Ref
SET HT
Degauss Coil

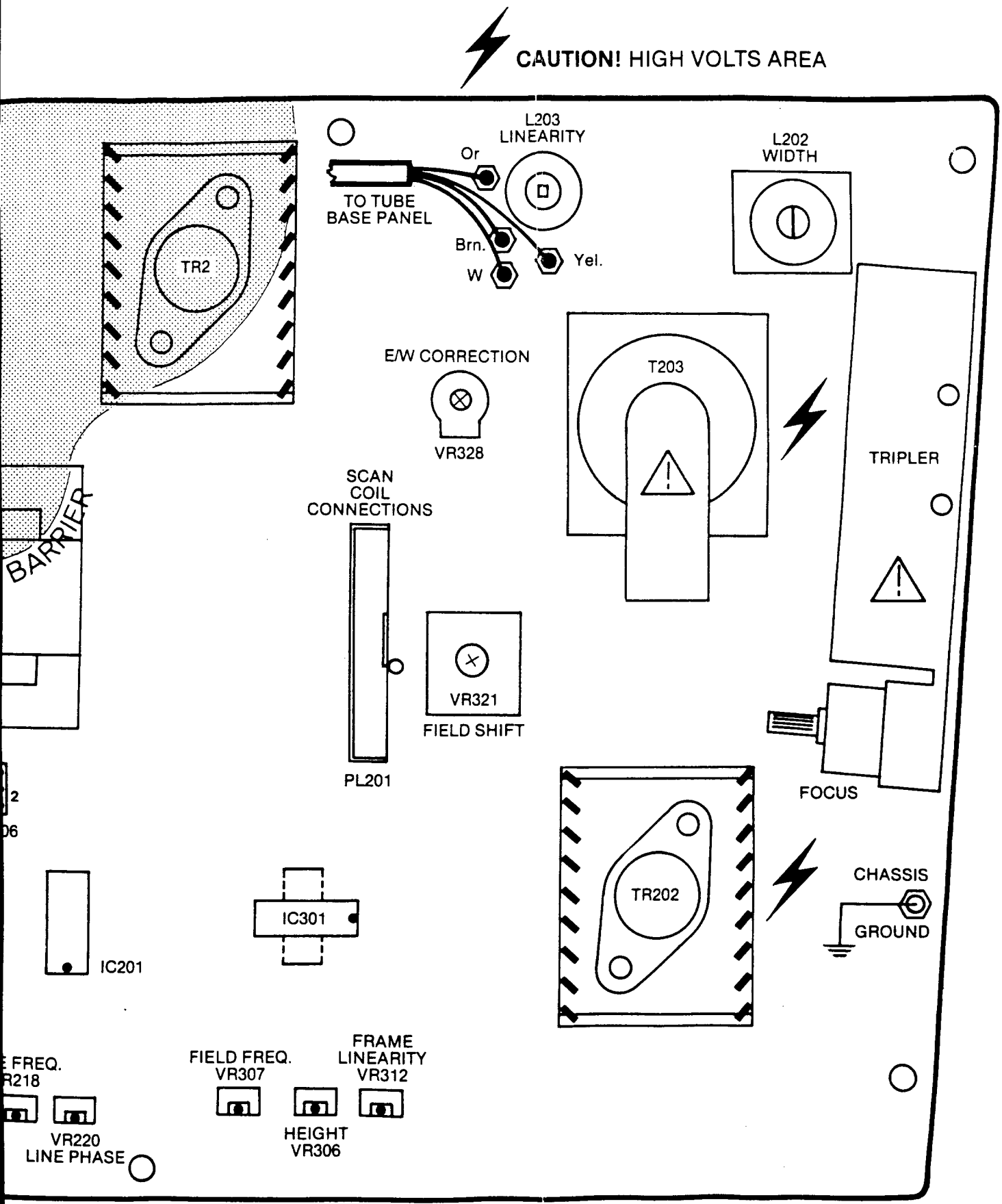

TUBE BASE PCB
DRIVE/DEFLECTION PCB
Non-isolated area
Primary
Ref
Base Drive
RED
GREEN
Orange
Mauve
Grey
Red
Green
Blue
Pink Mixed Blanking
IC381
TDA1178S
IC201
TDA1180P
IC1
78M12
IC182
78L05
Field Shift
Field Freq.
Height
Frame Linearity
Line Phase
Line Freq.
EW
E-W Transducer
T201
PC4163
TR381
TIP128
TR201
BF819A
BF850A
BF859A
TR981
MPSA42
TR982
BF869
TR983
MPSA42
TR984
BF869
TR987
2N4123
D107
1N4148
D116
1N4007
D117
BZX79
B12V
D118
BZX79
B5V6
D987
BZY88C7V5
D988
1N4148
D301
1N4148
D302
1N4007
D981
D982
D983
D984
2 x 1N4148
D15
D16
2 x 1N4007
D12
D13
D14
3 x 1N4148
D17
BA159
D22
BA159
D23
BYV96E
D6
BA157
D7
BYV96E
D21
1N4007
D24
BA157
D25
1N4007
D108
D110
D111
BZX79B5V6 x 3
TR2
BF213
TR103
2N4125
TR104
2N4125
TR105
2N4125
TR106
BC337
VR903
1K Gain
VR906
2K2
Black Level
VR910
1K Gain
VR914
2K2
Black Level
VR916
1K Gain
VR306
4.7K
VR307
100K
VR312
100K
VR320
470R
VR321
1K
VR328
470R
VR220
220K
VR218
22K
Tabs
LK11
LK12
LK13
LK14
LK16
LK18
LK8
LK2
Primary
Ref
Base Drive
245V
21V
5V
10V
12V
68V


TUBE BASE PCB
DRIVE/DEFLECTION PCB
RED
GREEN
BLUE
SPARK GAPS
Cathode Ray Tube
Orange
Mauve
Grey
Red
Green
Blue
Pink Mixed Blanking
Yellow
Brown
Focus
White
Frame Coils
Line Coils
TRIPLER
Field Shift
Field Freq.
Frame Linearity
Line Phase
Line Freq.
EW
Width
Heater Choke
TO CRT p BAND
TO CHASSIS

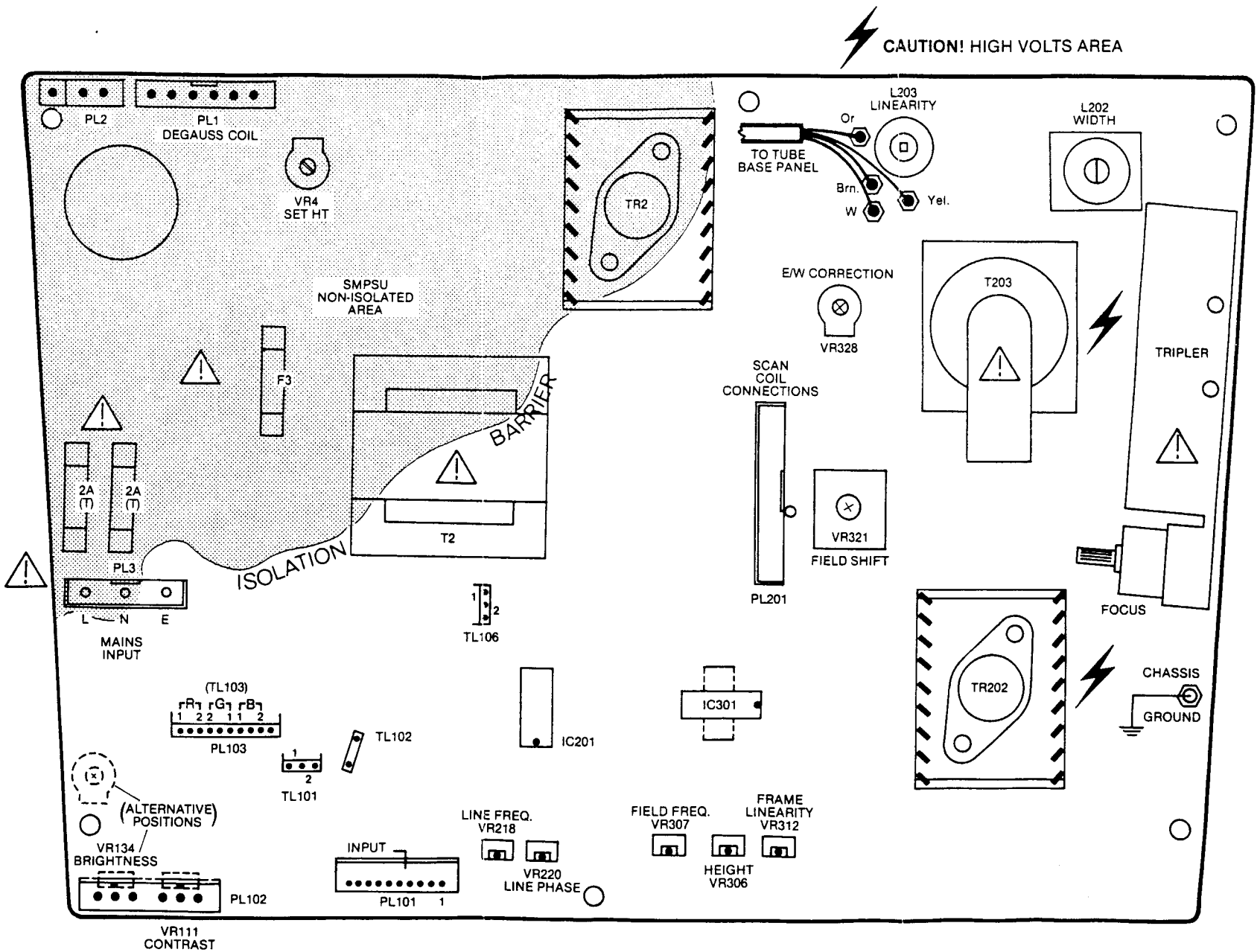

CRT BASE PCB
DRIVE/DEFLECTION PCB
SWITCH MODE P.S.U.
BLUE
GREEN
RED


PL2
PL1
DEGAUSS COIL
VR4
SET HT
SMPSU
NON-ISOLATED
AREA
F3
2A
(T)
2A
(T)
T2
ISOLATION
PL3
L
N
E
MAINS
INPUT
(TL103)
rR1 rG1 rB1
1 2 2 1 1 2
PL103
TL102
1
2
TL101
(ALTERNATIVE)
POSITIONS
VR134
BRIGHTNESS
INPUT
PL102
PL101 1
VR111
CONTRAST


CAUTIO
PL1
DEGAUSS COIL
VR4
SET HT
TR2
L203
LINEARITY
Or
TO TUBE
BASE PANEL
Brn.
Yel
W
E/W CORRECTION
VR328
SMPSU
NON-ISOLATED
AREA
F3
SCAN
COIL
CONNECTIONS
BARRIER

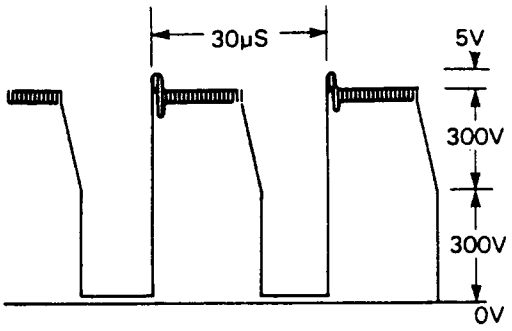


SERIES-3 MAIN CHASSIS - (COMPONENT SIDE SHOWING PRESETS/CONNECTORS AND WIRE LINK LOCATIONS ETC)



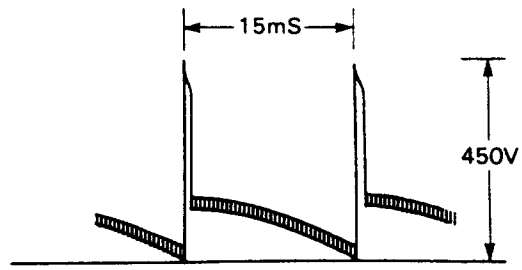
SERIES-3 MAIN CHASSIS - (COMPONENT SIDE SHOWING PRESETS/CONNECTORS AND WIRE LINK LOCATIONS ETC)

1 TR2 COLLECTOR
FUSE F3 IN - CONNECTOR
PL201 OUT (NO LOAD) 600V P/P



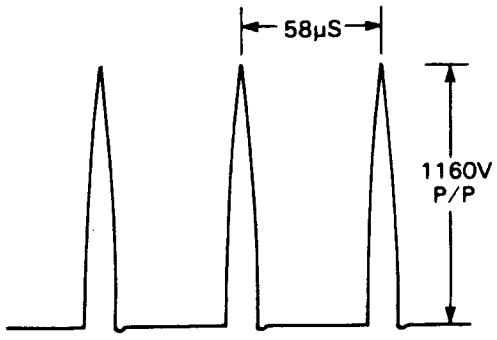
NO LOAD = PL 201 NOT CONNECTED

2 IC 301 PIN 4

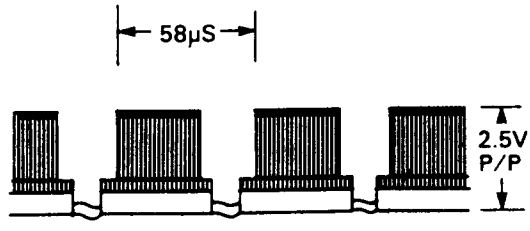


3 TR 102 C

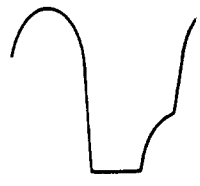
5 TR 202 COLLECTOR



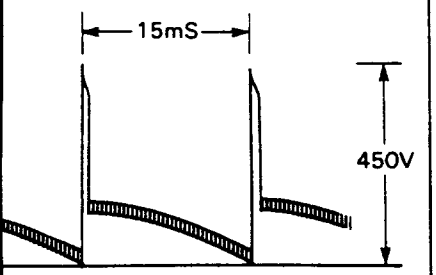
6 TUBE BASE INPUT SIGNAL



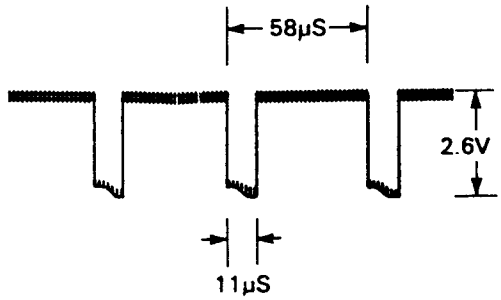
7 TR2 BAS
FUSE F3



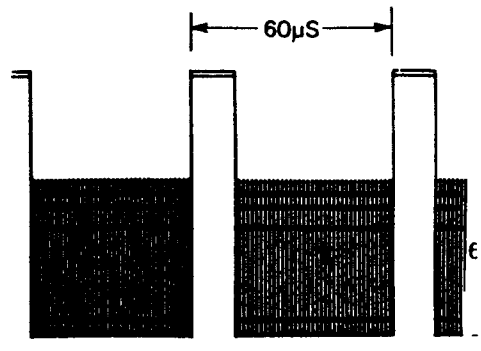
C 301 PIN 4



3 TR 102 COLLECTOR

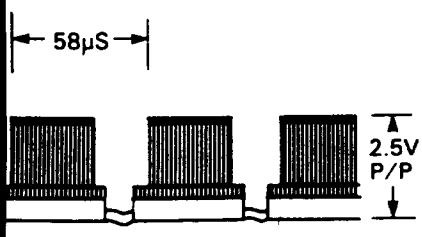


4 TR 905 EMITTER

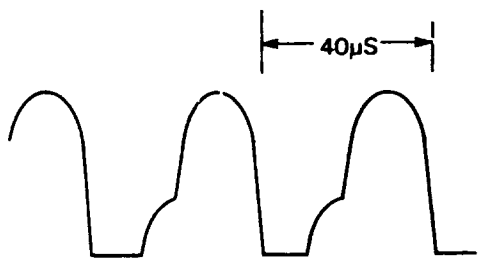


14

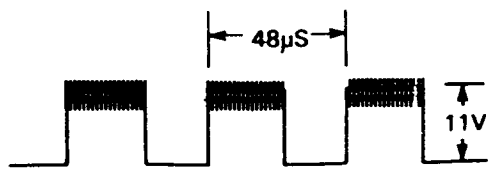
TUBE BASE INPUT SIGNAL



7 TR2 BASE START UP
FUSE F3 OUT



8 IC 201 PIN 3

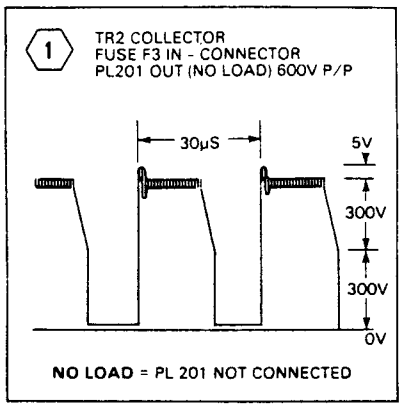


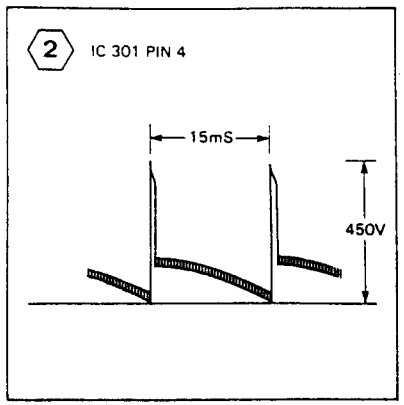
DRIVE/DEFLECTION PCB

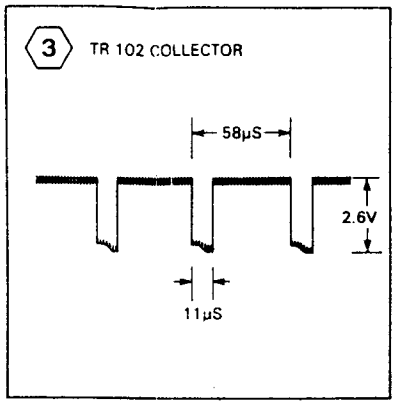
OLLECTOR

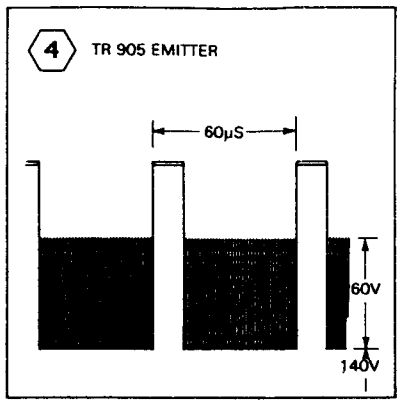
4 TR 905 EMITTER

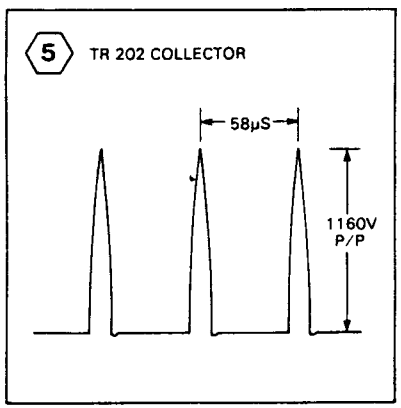
SAFETY AND ISOLATION!
The power supply is always live regardless of the mains supply polarity. Therefore for servicing, the monitor should be supplied through a mains Isolation Transformer of at least 300VA rating.

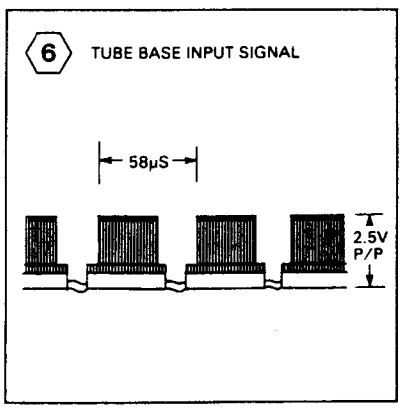


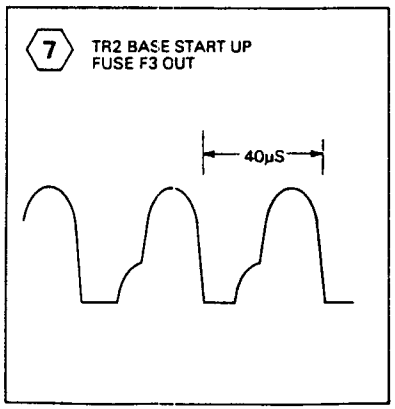


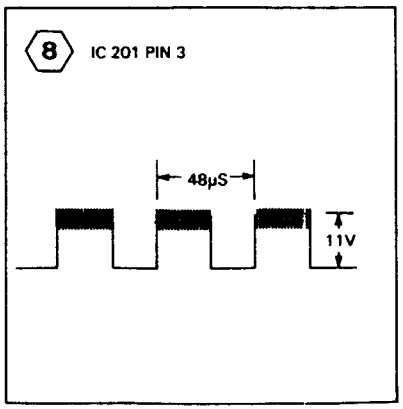












SAFETY AND ISOLATION!

The power supply is always live regardless of the mains supply polarity. Therefore for servicing, the monitor should be supplied through a mains Isolation Transformer of at least 300VA rating.
(See 'SAFETY NOTES' in SERVICE MANUAL).

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Components marked ⚠ on the circuit diagram and parts list are safety approved types and should only be replaced with components supplied or approved by our Service Department. It is recommended that other replaced parts should be of the type originally fitted, particularly resistors stood off the printed circuit boards.
FAILURE TO OBSERVE THE ABOVE MAY RENDER THE CHASSIS AND EXTERNAL ACCESSIBLE PARTS LIVE, OR CAUSE OTHER HAZARDS!

WAVEFORM MEASUREMENT POINTS

Waveform points are denoted thus (3)

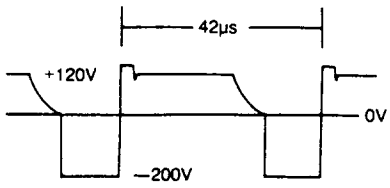
1) The numerical reference point on the circuit diagram relates to the corresponding numbered display on the accompanying table.
2) Waveform measurements were made using an oscilloscope of 20MHz minimum bandwidth and a ÷10 or ÷100 passive probe.

TYPICAL VOLTAGES - MEASUREMENT POINTS [3.0V]

1) Voltages denoted thus [3.0V] on the circuit diagram, are typical voltages only, and were measured using ahigh input impedance D.V.M.
2) Alternatively, Analogue meters of 20 KΩ/Volt minimum can be used.

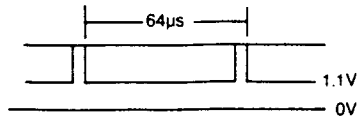
9 TEST POINT – D23 ANODE

Isolated secondary voltage drive winding (D23 anode). X100 probe.



10 TEST POINT – IC201 PINS 8 AND 9

Mixed sync pulses at line rate. X10 probe.

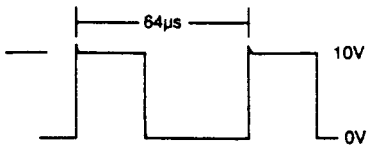


11 TEST POINT – IC201 PIN 6

Line flyback ref. pulse. X10 probe.

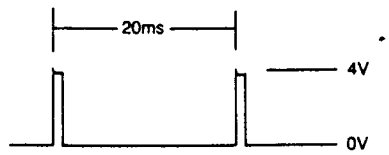
14 TEST POINT – IC201 PIN 3

Line drive information. X10 probe.



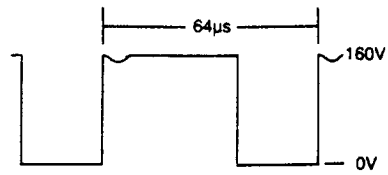
15 TEST POINT – IC201 PIN 10

Field sync. output. X10 probe.



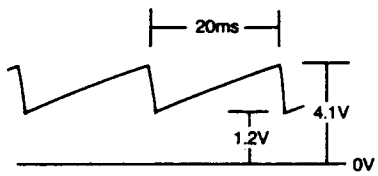
16 TEST POINT – TR201

TR201 Collector line driver primary waveform. X100 probe.



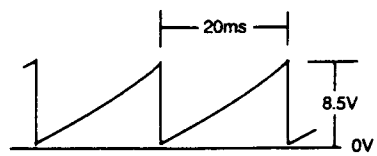
19 TEST POINT – IC301 PIN 9

Field oscillator waveform. X10 probe.



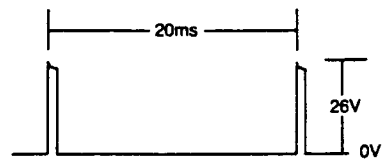
20 TEST POINT – IC301 PIN 12

Ramp generator. X10 probe.



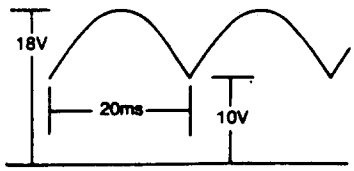
21 TEST POINT – IC301 PIN 3

Field flyback generator. X10 probe.



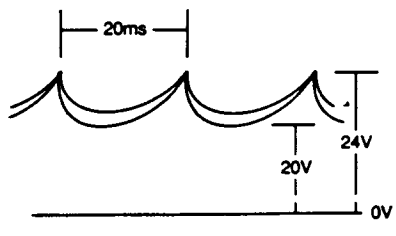
24 TEST POINT – TR301 BASE

Field parabola waveform. X10 probe.



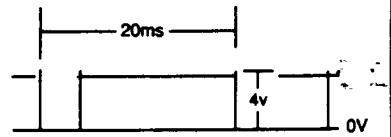
25 TEST POINT – TR301 COLLECTOR

E-W Transducer drive waveform. X10 probe.

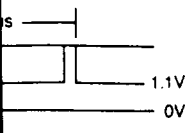


26 TEST POINTS – PL101 PINS 4, 6, 8

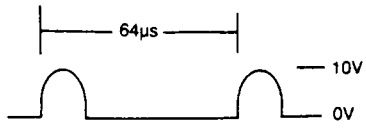
Video inputs (Red, Green and Blue). X10 probe.



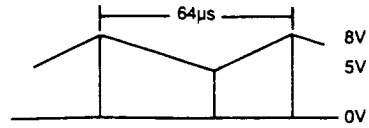
IC201 PINS 8 AND 9
ses at line rate. X10 probe.



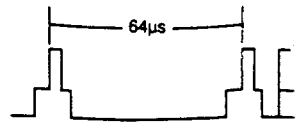
11 TEST POINT – IC201 PIN 6
Line flyback ref. pulse. X10 probe.



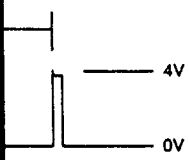
12 TEST POINT – IC201 PIN 14
Line oscillator. X10 probe.



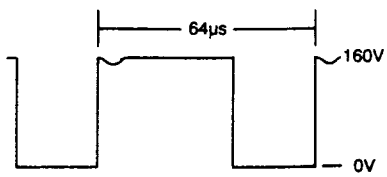
13 TEST POINT – IC201 PIN 7
Sandcastle pulse. X10 probe.



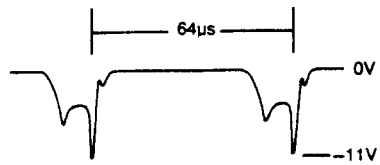
IC201 PIN 10
ut. X10 probe.



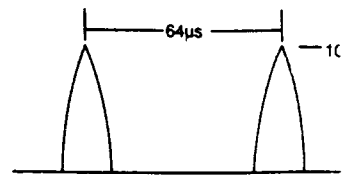
16 TEST POINT – TR201
TR201 Collector line driver primary waveform. X100 probe.



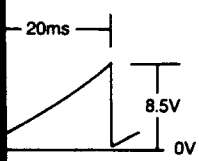
17 TEST POINT – TR202 BASE
Line output transistor base drive voltage. X10 probe.



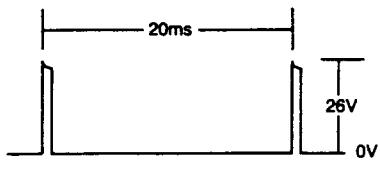
18 TEST POINT – TR202 COLLECTOR
Line output transformer collector -e voltage. X100 probe.



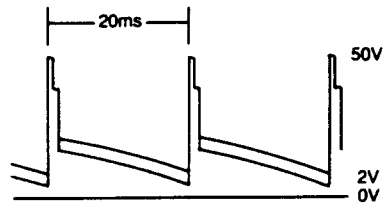
IC301 PIN 12
r. X10 probe.



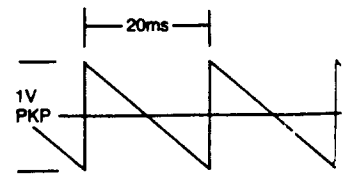
21 TEST POINT – IC301 PIN 3
Field flyback generator. X10 probe.



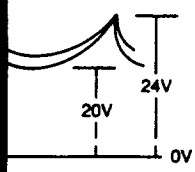
22 TEST POINT – IC301 PIN 4
Field output waveform. X10 probe.



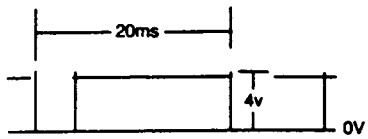
23 TEST POINT – CHECK ON R323
Field coils (Sawtooth current). X10



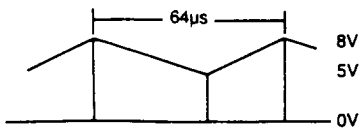
TR301 COLLECTOR
r drive waveform.



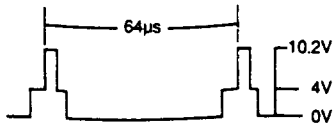
26 TEST POINTS – PL101 PINS 4, 6, 8
Video inputs (Red, Green and Blue). X10 probe.



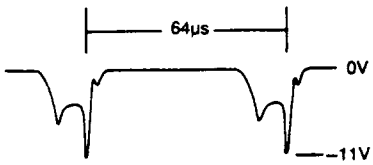
(12) TEST POINT – IC201 PIN 14
Line oscillator. X10 probe.



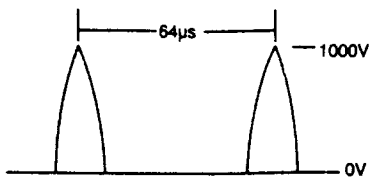
(13) TEST POINT – IC201 PIN 7
Sandcastle pulse. X10 probe.



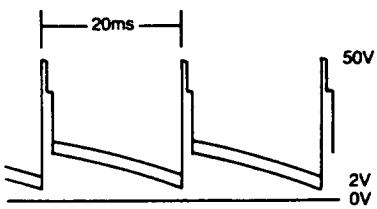
(17) TEST POINT – TR202 BASE
Line output transistor base drive voltage. X10 probe.



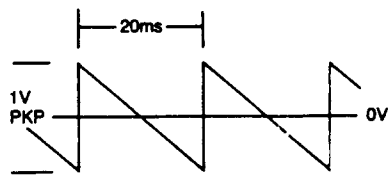
(18) TEST POINT – TR202 COLLECTOR
Line output transformer collector -emitter voltage. X100 probe.



(22) TEST POINT – IC301 PIN 4
Field output waveform. X10 probe.



(23) TEST POINT – CHECK ON R323
Field coils (Sawtooth current). X10 probe.



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Waveform points are denoted thus (3)

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1) Voltages denoted thus 3.0V on the circuit diagram, are typical voltages only, and were measured using a high input impedance D.V.M.
2) Alternatively, Analogue meters of 20 Kn/Volt minimum can be used.

NOTE

Waveform points denoted thus (3) are NOT shown on the circuit diagram. Component pin numbers are given as test points on the associated waveforms.

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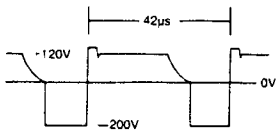
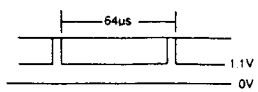
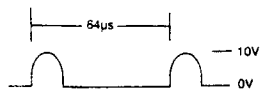
Isolated secondary voltage drive winding (D23 anode). X100 probe.



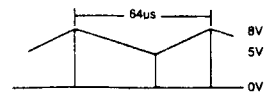
10 TEST POINT – IC201 PINS 8 AND 9
Mixed sync pulses at line rate. X10 probe.



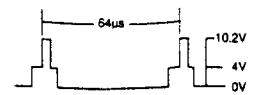
11 TEST POINT – IC201 PIN 6
Line flyback ref. pulse. X10 probe.



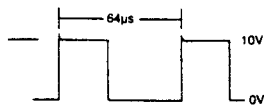
12 TEST POINT – IC201 PIN 14
Line oscillator. X10 probe.



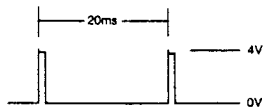
13 TEST POINT – IC201 PIN 7
Sandcastle pulse. X10 probe.



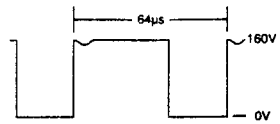
14 TEST POINT – IC201 PIN 3
Line drive information. X10 probe.



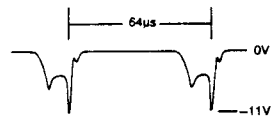
15 TEST POINT – IC201 PIN 10
Field sync. output. X10 probe.



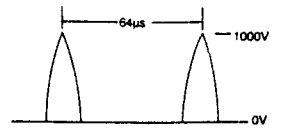
16 TEST POINT – TR201
TR201 Collector line driver primary waveform. X100 probe.



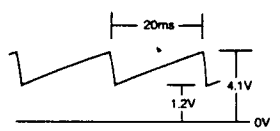
17 TEST POINT – TR202 BASE
Line output transistor base drive voltage. X10 probe.



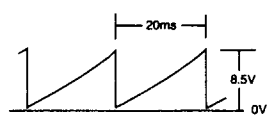
18 TEST POINT – TR202 COLLECTOR
Line output transformer collector -emitter voltage. X100 probe.



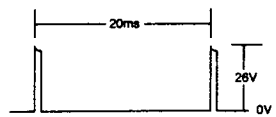
19 TEST POINT – IC301 PIN 9
Field oscillator waveform. X10 probe.



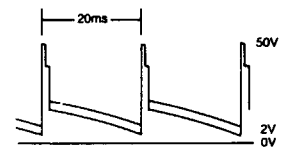
20 TEST POINT – IC301 PIN 12
Ramp generator. X10 probe.



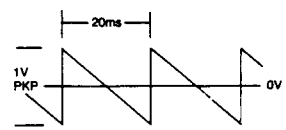
21 TEST POINT – IC301 PIN 3
Field flyback generator. X10 probe.



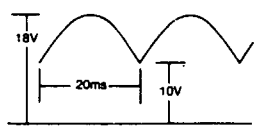
22 TEST POINT – IC301 PIN 4
Field output waveform. X10 probe.



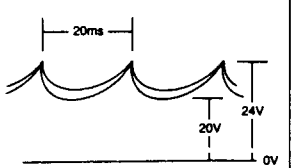
23 TEST POINT – CHECK ON R323
Field coils (Sawtooth current). X10 probe.



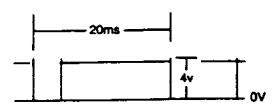
24 TEST POINT – TR301 BASE
Field parabola waveform. X10 probe.



25 TEST POINT – TR301 COLLECTOR
E-W Transducer drive waveform. X10 probe.



26 TEST POINTS – PL101 PINS 4, 6, 8
Video inputs (Red, Green and Blue). X10 probe.



SAFETY AND ISOLATION!

The power supply is always live regardless of the mains supply polarity. Therefore for servicing, the monitor should be supplied through a mains Isolation Transformer of at least 300VA rating. (See 'SAFETY NOTES' in SERVICE MANUAL).

SAFETY CRITICAL COMPONENTS

Components marked ⚠ on the circuit diagram and parts list are safety approved types and should only be replaced with components supplied or approved by our Service Department. It is recommended that other replaced parts should be of the type originally fitted, particularly resistors stood off the printed circuit boards.
FAILURE TO OBSERVE THE ABOVE MAY RENDER THE CHASSIS AND EXTERNAL ACCESSIBLE PARTS LIVE, OR CAUSE OTHER HAZARDS!

WAVEFORM MEASUREMENT POINTS

Waveform points are denoted thus (3)

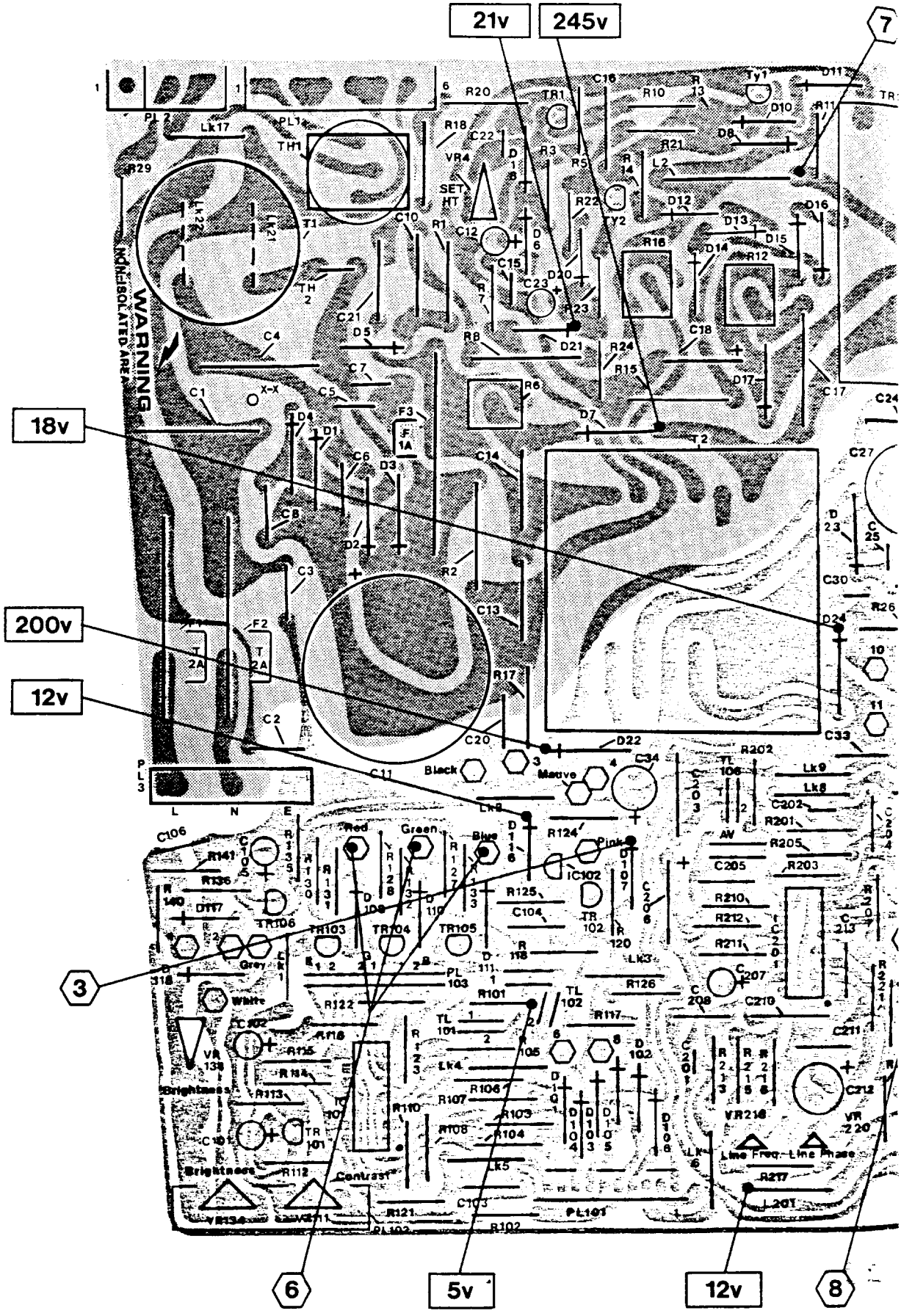
1) The numerical reference point on the circuit diagram relates to the corresponding numbered display on the accompanying table.
2) Waveform measurements were made using an oscilloscope of 20MHz minimum bandwidth and a +10 or +100 passive probe.

TYPICAL VOLTAGES – MEASUREMENT POINTS

1) Voltages denoted thus [3.0V] on the circuit diagram, are typical voltages only, and were measured using a high input impedance D.V.M.
2) Alternatively, Analogue meters of 20 Kn/Volt minimum can be used.

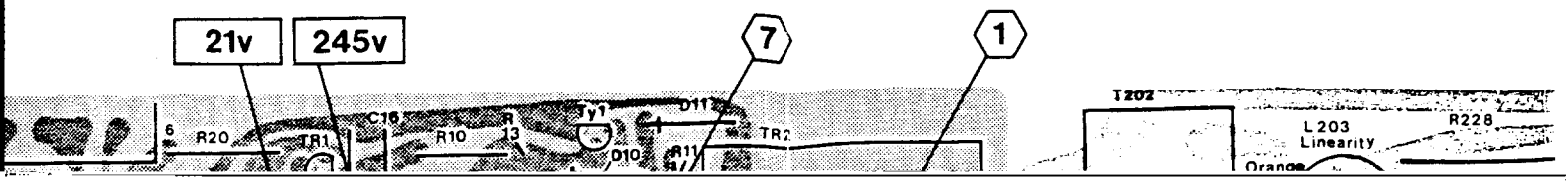
NOTE

Waveform points denoted thus (3) are NOT shown on the circuit diagram. Component pin numbers are given as test points on the associated waveforms.

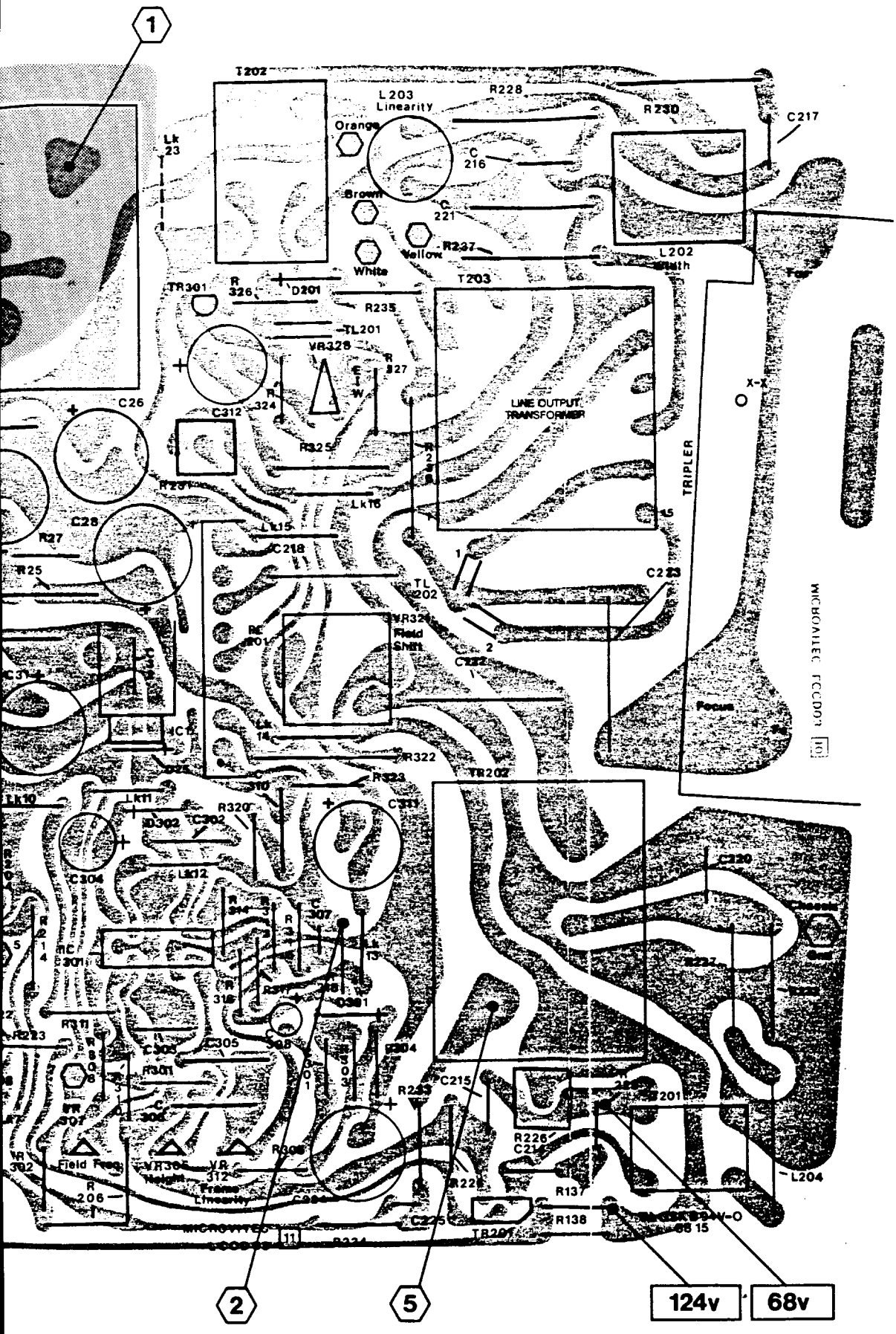


⬡ DENOTES TEST WAVEFORM MEASURING POINT

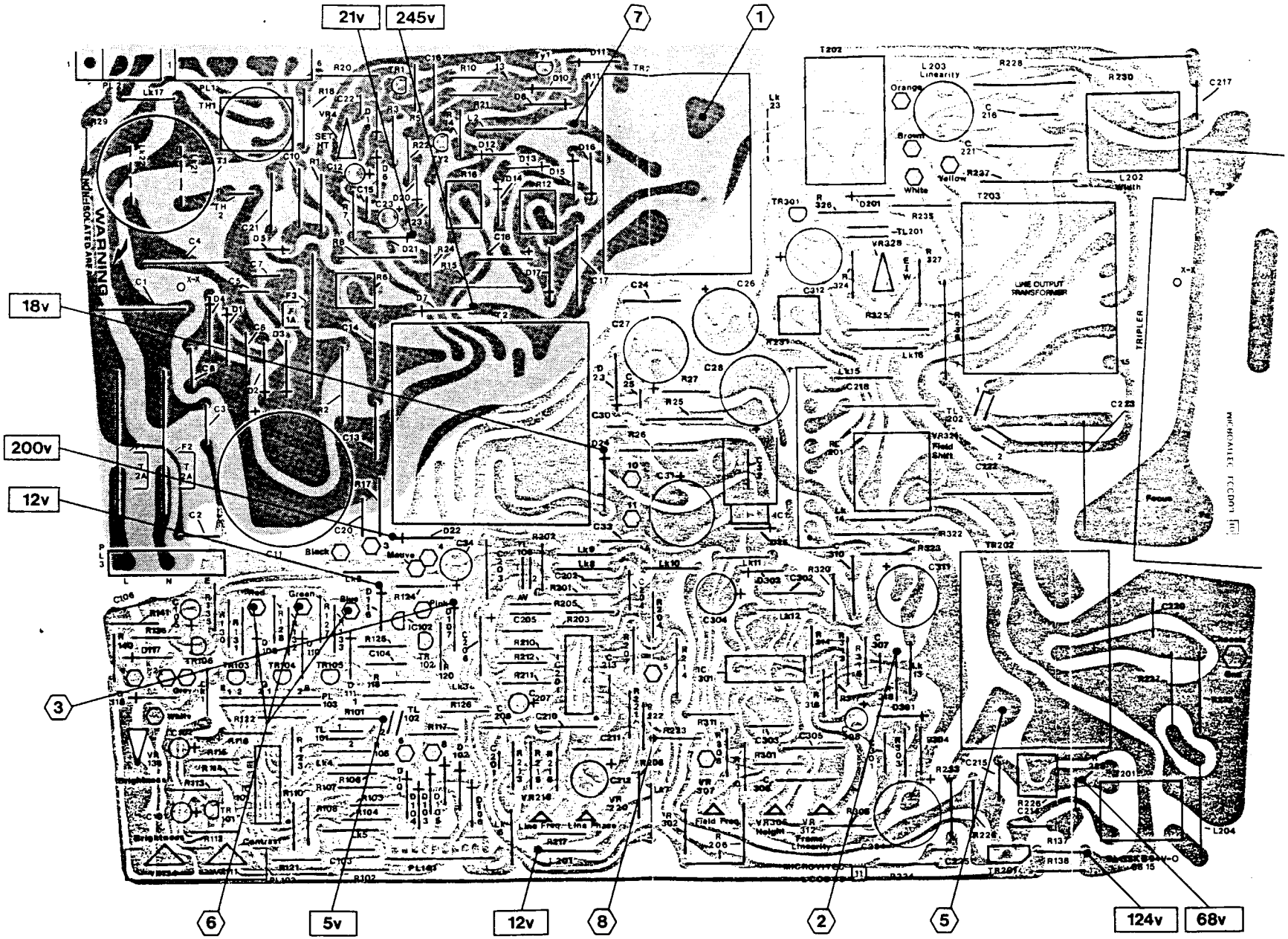
▭ DENOTES TEST VOLTAGE MEASURING POINT


21v
245v
7
1
6
R20
TR1
C16
R10
13
D10
D11
TR2
T202
L 203
Linearity
R228
Orange

DRIVE/DEFLECTION PCB



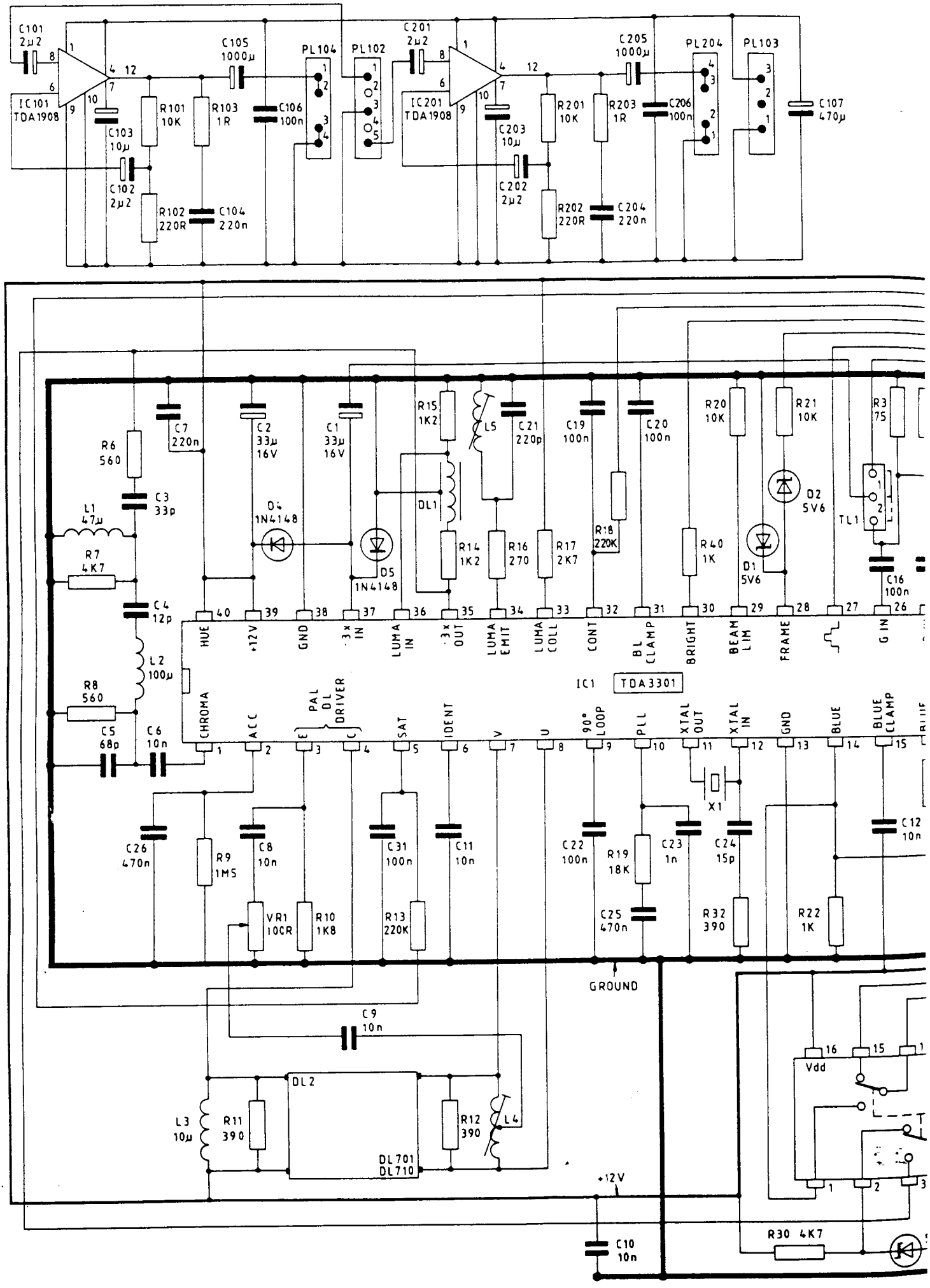
SERIES 3 DRIVE/DEFLECTION PCB - TRACK (SOLDER) SIDE VIEWED THROUGH PCB FROM COMPONENT SIDE

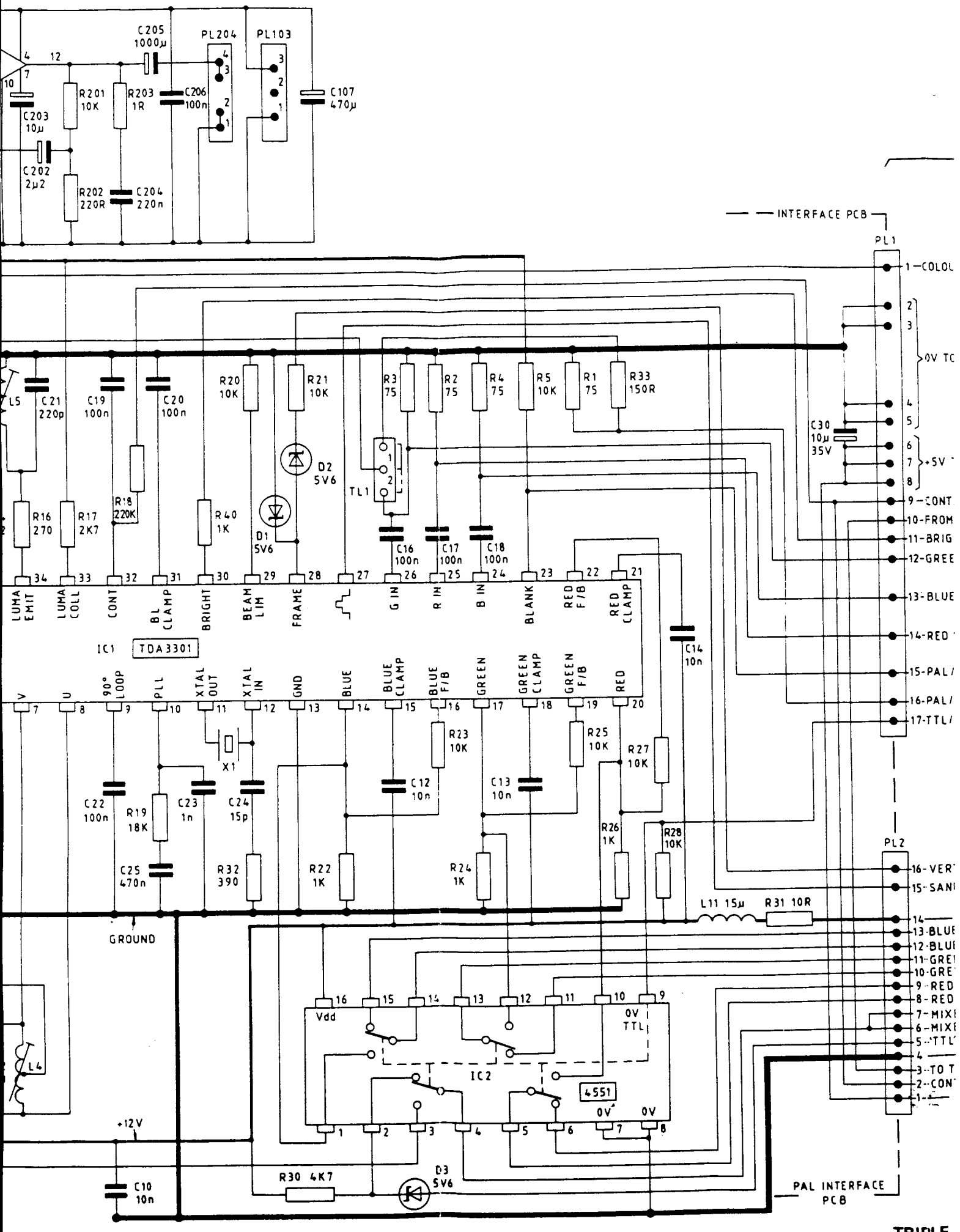


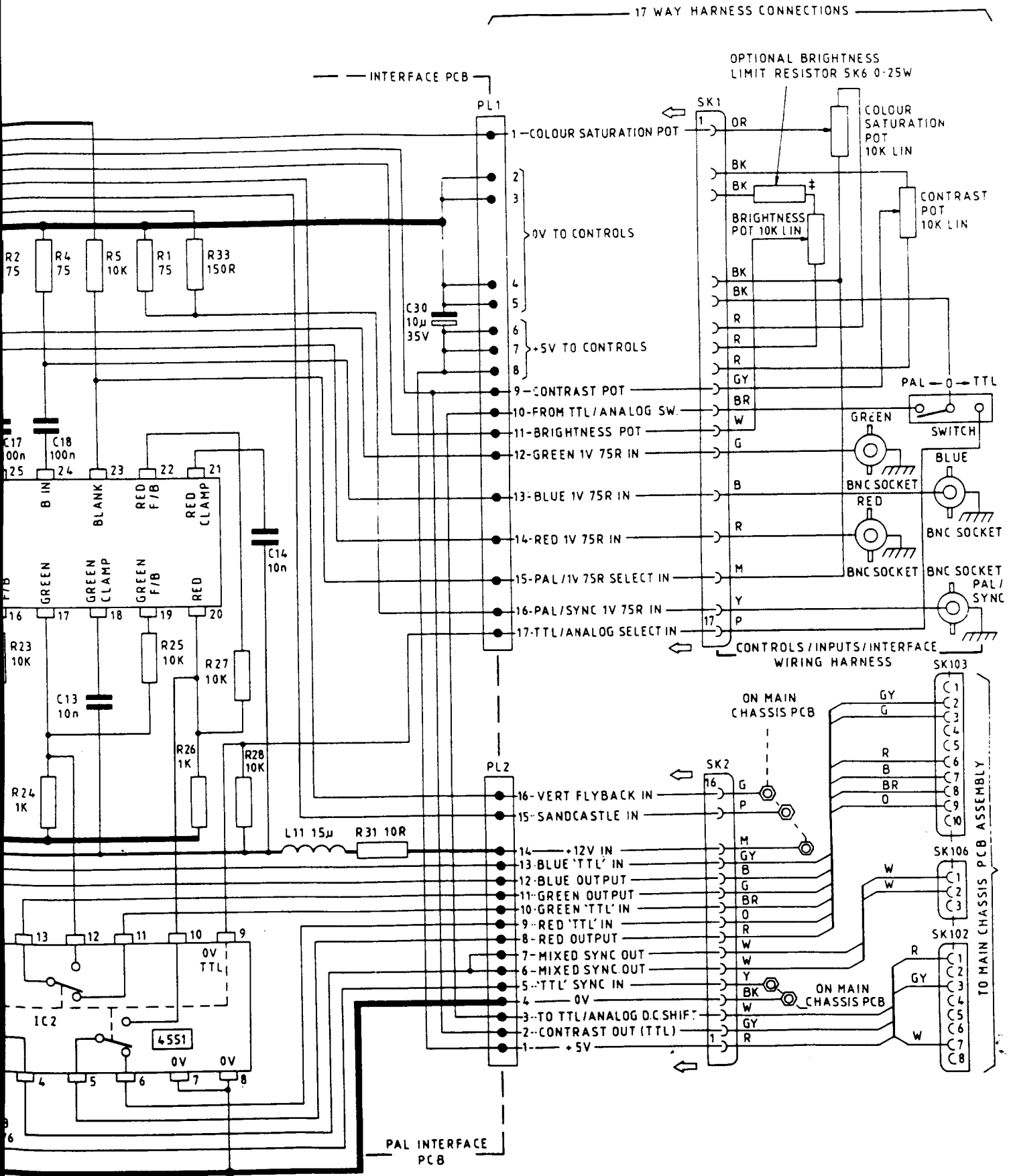
DENOTES TEST WAVEFORM MEASURING POINT

DENOTES TEST VOLTAGE MEASURING POINT

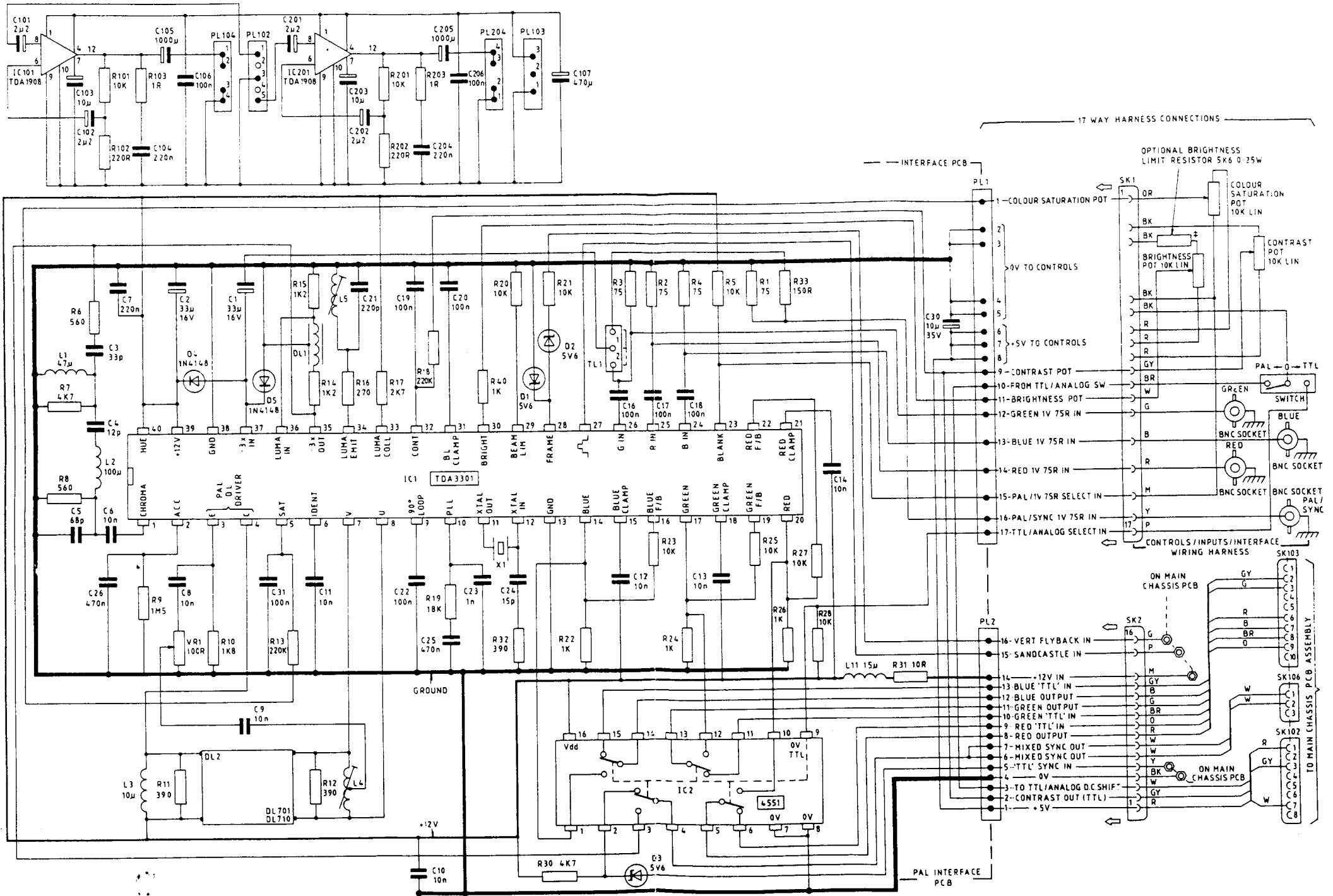
SERIES 3 DRIVE/DEFLECTION PCB - TRACK (SOLDER) SIDE VIEWED THROUGH PCB FROM COMPONENT SIDE


C101 2µ2
IC101 TDA1908
C103 10µ
C102 2µ2
R101 10K
R102 220R
C105 1000µ
R103 1R
C104 220n
C106 100n
PL104
PL102
C201 2µ2
IC201 TDA1908
C203 10µ
C202 2µ2
R201 10K
R202 220R
C205 1000µ
R203 1R
C204 220n
C206 100n
PL204
PL103
C107 470µ
R6 560
C7 220n
C2 33µ 16V
C1 33µ 16V
R15 1K2
L5
C21 220p
C19 100n
C20 100n
R20 10K
R21 10K
R3 75
C3 33p
L1 47µ
D4 1N4148
DL1
D5 1N4148
R14 1K2
R16 270
R17 2K7
R18 220K
R40 1K
D1 5V6
D2 5V6
TL1
C16 100n
R7 4K7
C4 12p
L2 100µ
R8 560
C5 68p
C6 10n
HUE
+12V
GND
3x IN
LUMA IN
3x OUT
LUMA EMIT
LUMA COLL
CONT
BL CLAMP
BRIGHT
BEAM LIM
FRAME
G IN
IC1 TDA3301
CHROMA
ACC
PAL DL DRIVER
SAT
IDENT
V
U
90° LOOP
PLL
XTAL OUT
XTAL IN
GND
BLUE
BLUE CLAMP
X1
C26 470n
R9 1M5
C8 10n
VR1 10CR
R10 1K8
C31 100n
R13 220K
C11 10n
C22 100n
R19 18K
C23 1n
C24 15p
C25 470n
R32 390
R22 1K
C12 10n
GROUND
C9 10n
DL2
L3 10µ
R11 390
R12 390
L4
DL701 DL710
+12V
C10 10n
Vdd
R30 4K7

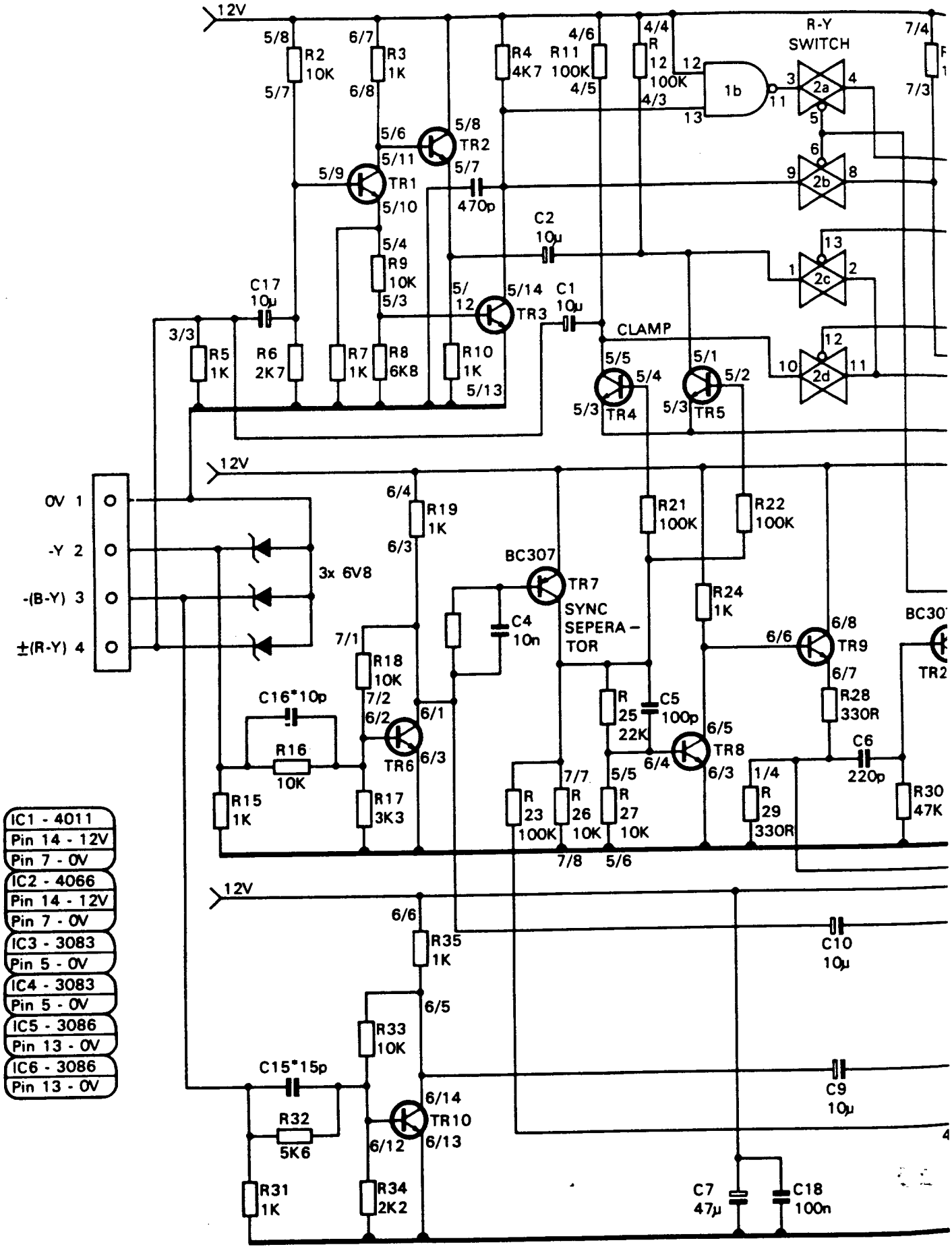

C205 1000µ
PL204
PL103
C203 10µ
C202 2µ2
R201 10K
R202 220R
R203 1R
C204 220n
C206 100n
C107 470µ
INTERFACE PCB
PL1
1—COLOL
0V TO
+5V
9—CONT
10—FROM
11—BRIG
12—GREE
13—BLUE
14—RED
15—PAL/
16—PAL/
17—TTL/
C30 10µ 35V
L5
C21 220p
C19 100n
C20 100n
R20 10K
R21 10K
R3 75
R2 75
R4 75
R5 10K
R1 75
R33 150R
D2 5V6
D1 5V6
TL1
R16 270
R17 2K7
R18 220K
R40 1K
C16 100n
C17 100n
C18 100n
LUMA EMIT
LUMA COLL
CONT
BL CLAMP
BRIGHT
BEAM LIM
FRAME
G IN
R IN
B IN
BLANK
RED F/B
RED CLAMP
C14 10n
IC1 TDA3301
V
U
90° LOOP
PLL
XTAL OUT
XTAL IN
GND
BLUE
BLUE CLAMP
BLUE F/B
GREEN
GREEN CLAMP
GREEN F/B
RED
X1
R23 10K
R25 10K
R27 10K
C22 100n
R19 18K
C23 1n
C24 15p
C25 470n
R32 390
C12 10n
C13 10n
R22 1K
R24 1K
R26 1K
R28 10K
PL2
16-VER
15-SANI
L11 15µ
R31 10R
14
13-BLUE
12-BLUE
11-GRE
10-GRE
9-RED
8-RED
7-MIXI
6-MIXI
5-TTL
4
3-TO T
2-CON
1-+
GROUND
L4
+12V
C10 10n
R30 4K7
D3 5V6
Vdd
0V TTL
IC2
4551
0V
0V
PAL INTERFACE PCB

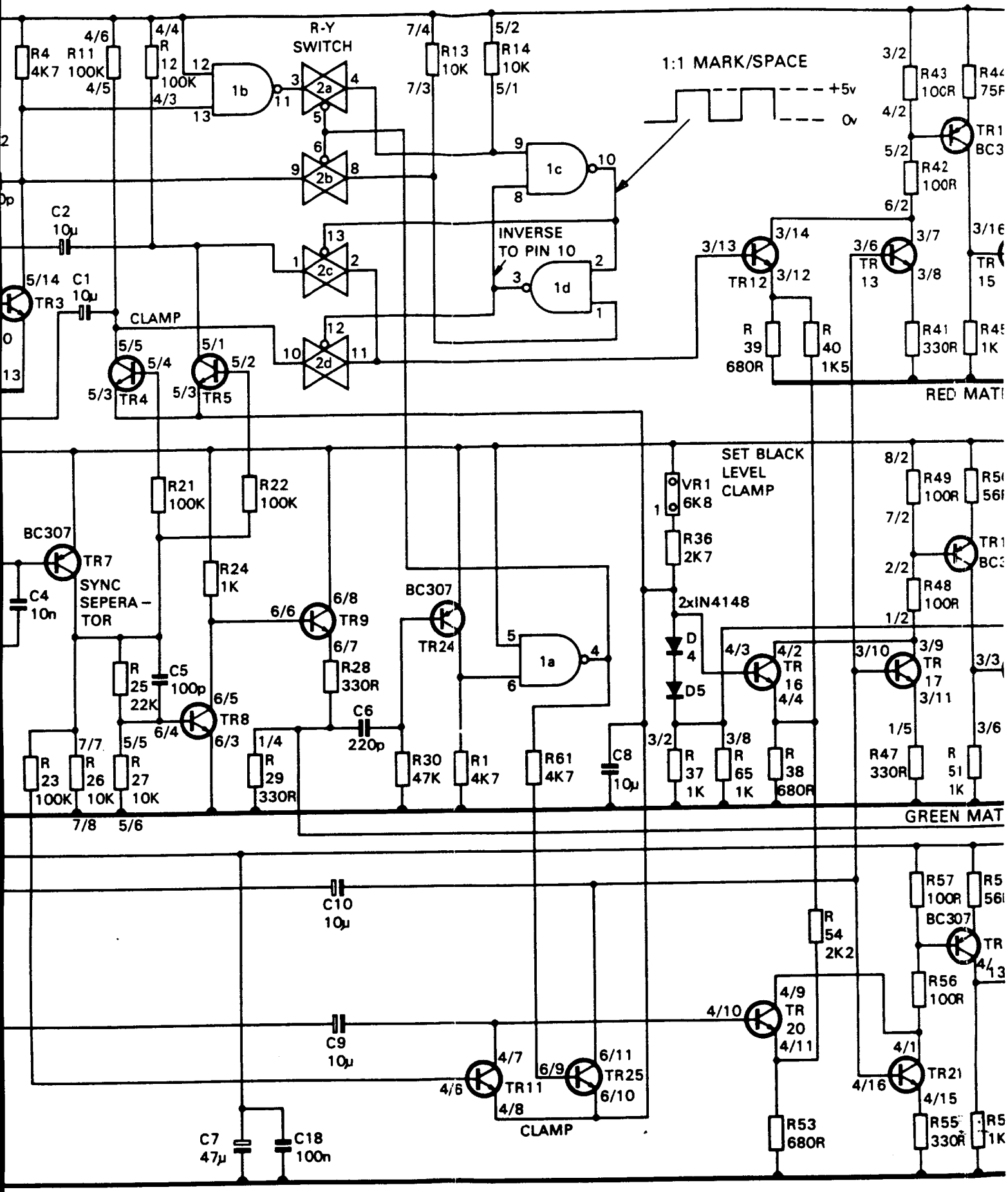


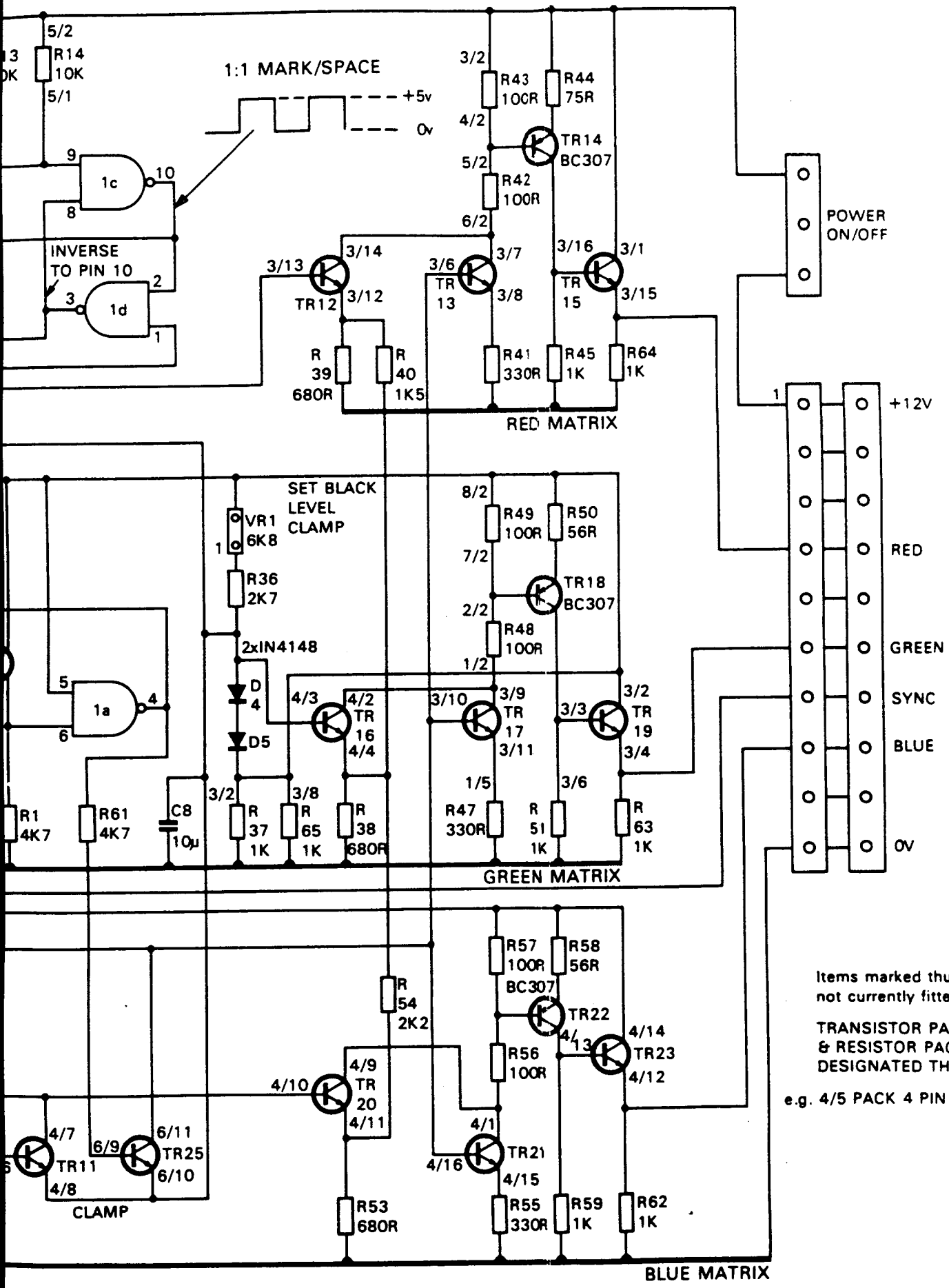
TRIPLE STANDARD - PAL INTERFACE CIRCUIT DIAGRAM



TRIPLE STANDARD - PAL INTERFACE CIRCUIT DIAGRAM


12V
R-Y SWITCH
R2 10K
R3 1K
R4 4K7
R11 100K
R
12 100K
1b
2a
2b
2c
2d
TR1
TR2
TR3
TR4
TR5
470p
C2 10µ
C17 10µ
C1 10µ
CLAMP
R5 1K
R6 2K7
R7 1K
R8 6K8
R9 10K
R10 1K
0V 1
-Y 2
-(B-Y) 3
±(R-Y) 4
3x 6V8
R19 1K
R21 100K
R22 100K
BC307
TR7
SYNC SEPERA – TOR
R24 1K
C4 10n
R18 10K
C16*10p
R16 10K
R15 1K
R17 3K3
TR6
R 25 22K
C5 100p
TR8
R 23 100K
R 26 10K
R 27 10K
R 29 330R
R30 47K
TR9
R28 330R
C6 220p
BC30
TR2
R35 1K
C10 10µ
R33 10K
C15*15p
R32 5K6
TR10
R31 1K
R34 2K2
C7 47µ
C18 100n
IC1 - 4011
Pin 14 - 12V
Pin 7 - 0V
IC2 - 4066
Pin 14 - 12V
Pin 7 - 0V
IC3 - 3083
Pin 5 - 0V
IC4 - 3083
Pin 5 - 0V
IC5 - 3086
Pin 13 - 0V
IC6 - 3086
Pin 13 - 0V


R-Y SWITCH
1:1 MARK/SPACE
+5v
0v
INVERSE TO PIN 10
CLAMP
SET BLACK LEVEL CLAMP
SYNC SEPERA – TOR
2xIN4148
RED MAT
GREEN MAT
CLAMP
R4 4K7
R11 100K
C2 10µ
C1 10µ
TR3
TR4
TR5
R21 100K
R22 100K
R24 1K
BC307
TR7
C4 10n
R 25 22K
C5 100p
TR8
R 23 100K
R 26 10K
R 27 10K
R 29 330R
C6 220p
TR9
R28 330R
BC307
TR24
R30 47K
R1 4K7
R61 4K7
C8 10µ
VR1 6K8
R36 2K7
D 4
D5
R 37 1K
R 65 1K
R 38 680R
TR 16
TR 17
R 39 680R
R 40 1K5
TR12
TR 13
R41 330R
R43 100R
R42 100R
R49 100R
R48 100R
R47 330R
R 51 1K
C10 10µ
C9 10µ
C7 47µ
C18 100n
TR11
TR25
R 54 2K2
TR 20
R53 680R
R57 100R
R56 100R
TR21
R55 330R

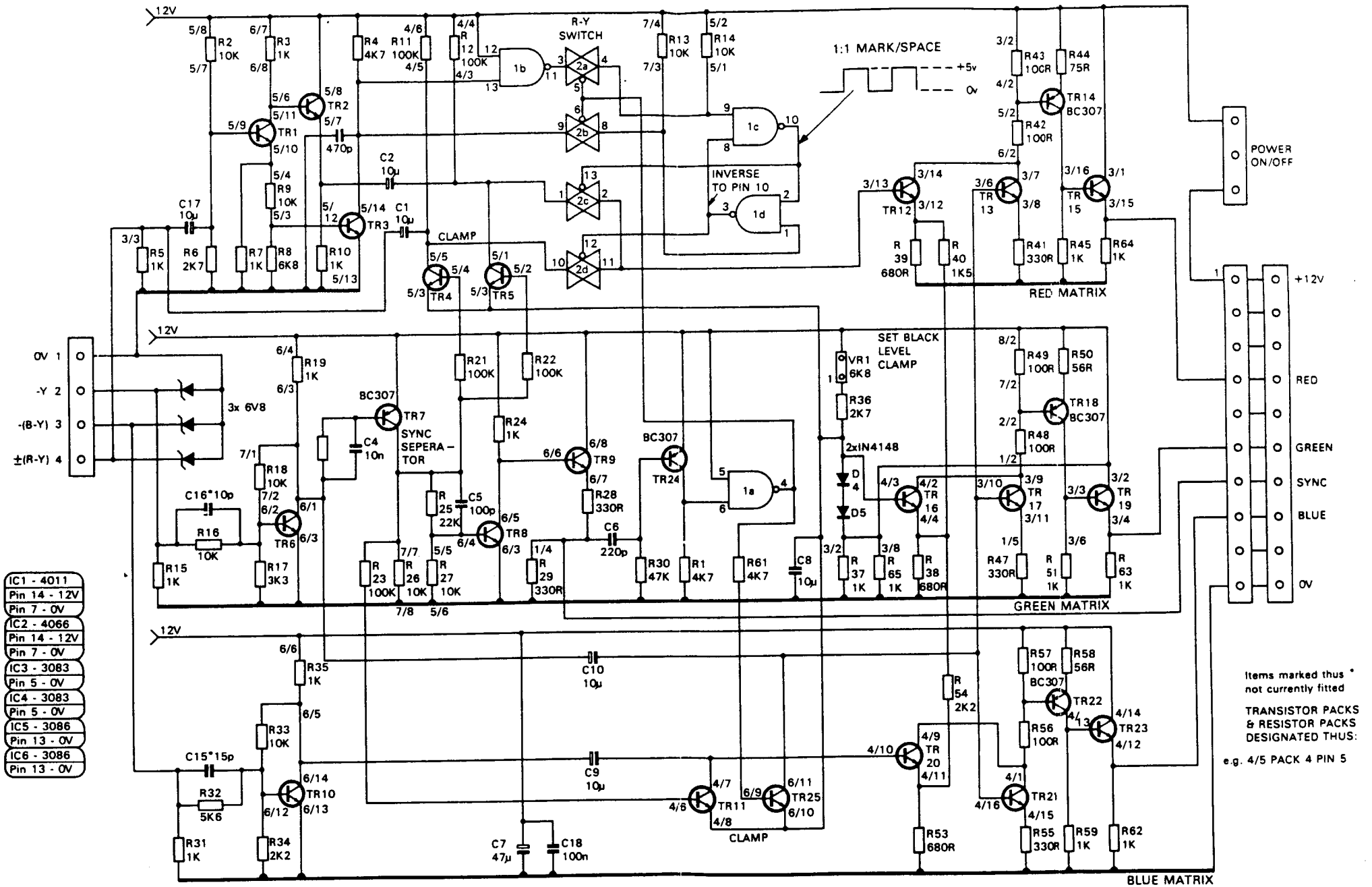


Items marked thus * not currently fitted

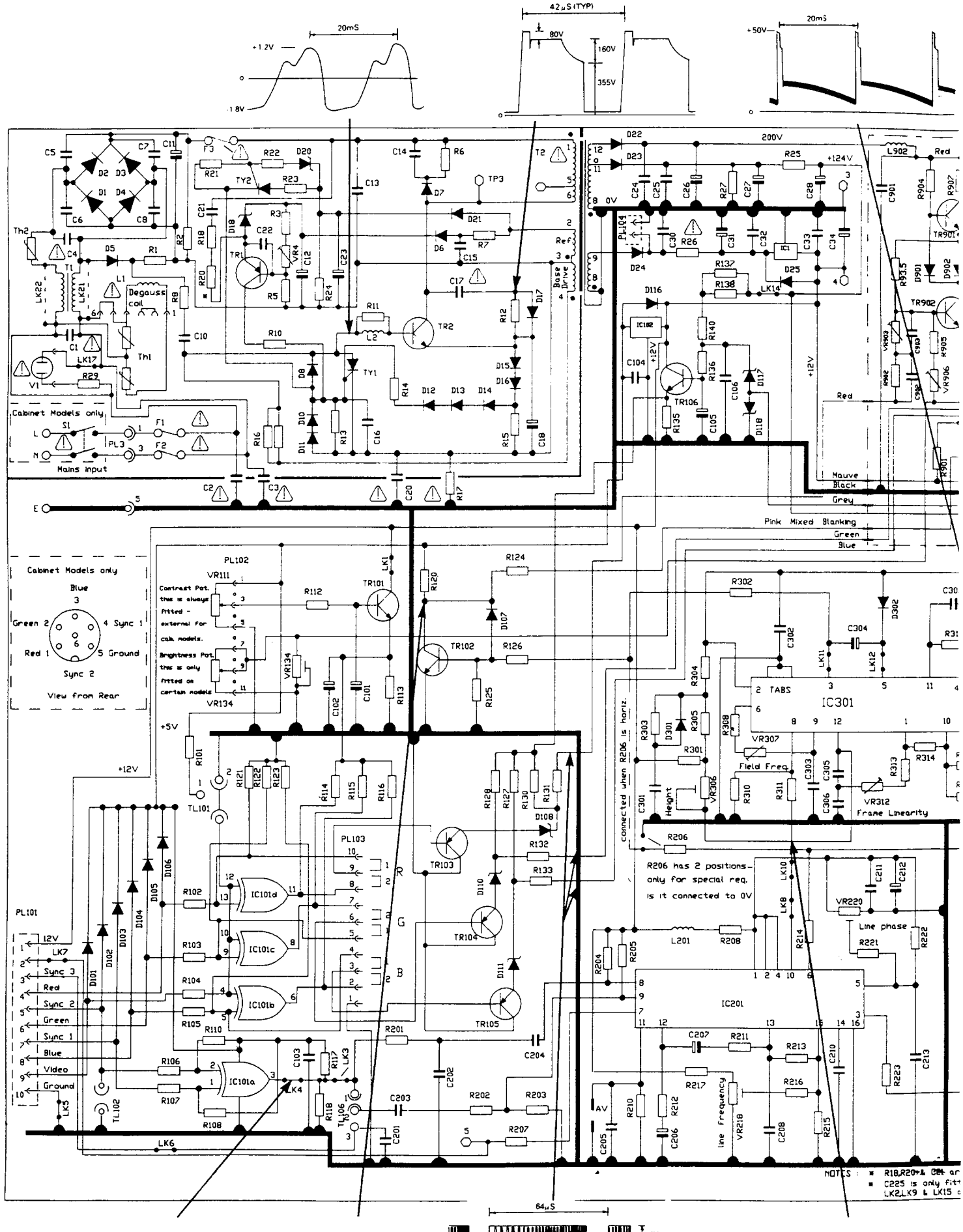
TRANSISTOR PACKS & RESISTOR PACKS DESIGNATED THUS:

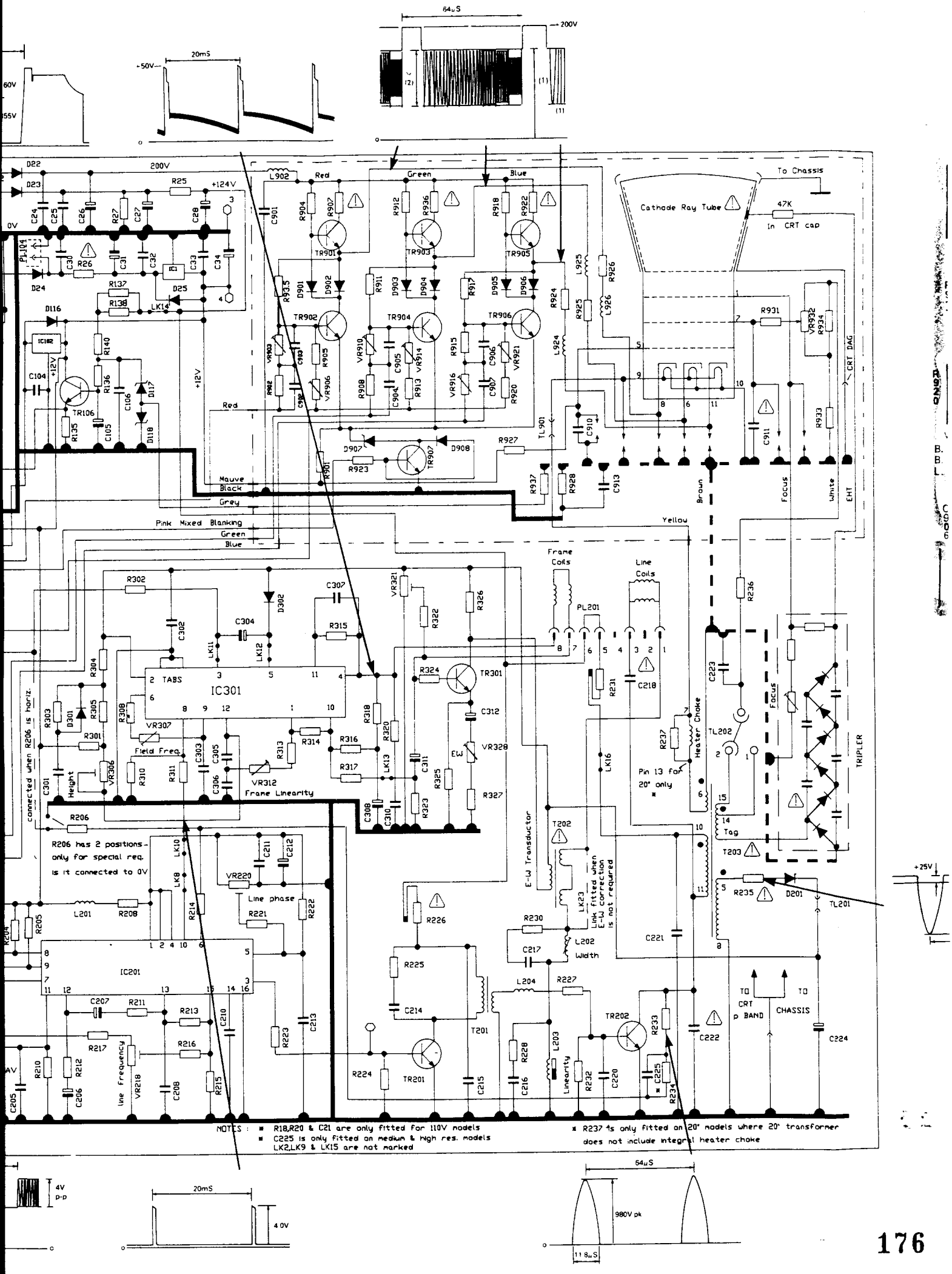
e.g. 4/5 PACK 4 PIN 5

SINCLAIR ZX SPECTRUM INTERFACE

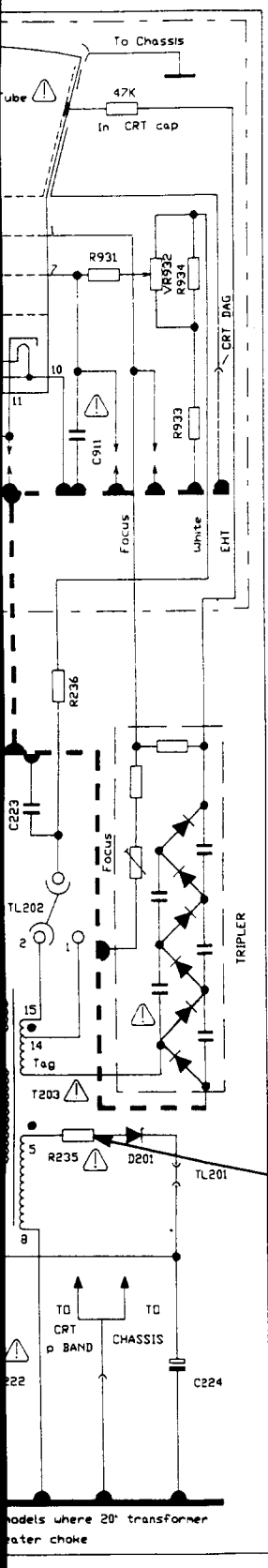


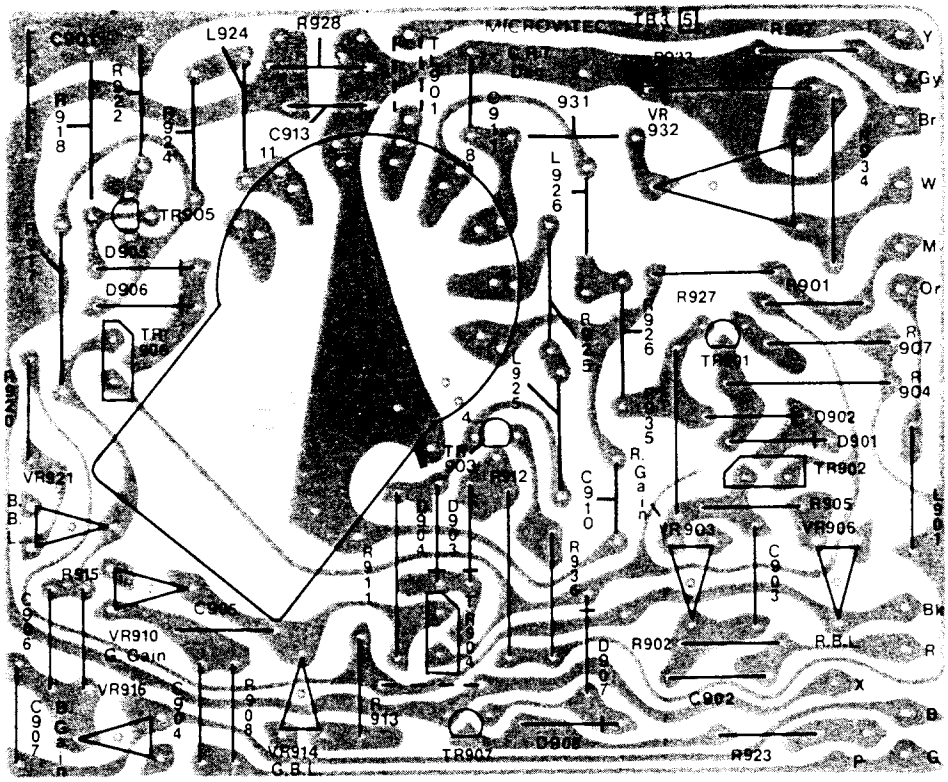
SINCLAIR ZX SPECTRUM INTERFACE

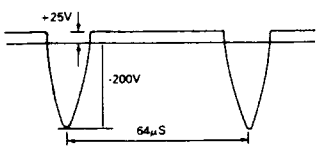

20mS
+1.2V
0
-1.8V
42μS (TYP)
80V
160V
355V
20mS
+50V
0
200V
+124V
0V
+12V
Red
Mauve
Black
Grey
Pink Mixed Blanking
Green
Blue
Cabinet Models only
Mains input
Degauss coil
Base Drive
Ref.
Cabinet Models only
Blue
Green 2
4 Sync 1
Red 1
5 Ground
Sync 2
6
View from Rear
PL102
VR111
Contrast Pot. this is always fitted - external for cab models.
Brightness Pot. this is only fitted on certain models
VR134
+5V
+12V
PL101
12V
Sync 3
Red
Sync 2
Green
Sync 1
Blue
Video
Ground
PL103
R
G
B
IC101d
IC101c
IC101b
IC101a
IC301
TABS
Field Freq.
Height
VR312
Frame Linearity
connected when R206 is horiz.
R206 has 2 positions - only for special req. is it connected to 0V
IC201
Line phase
Line frequency
AV
TR101
TR102
TR103
TR104
TR105
TR106
TR901
TR902
TR2
TR1
IC1
IC102
IC104
NOTES :
64μS
4V p-p
6.2V
20mS
+1.2V
64μS
+2V
11.4μS
20mS
4.0V

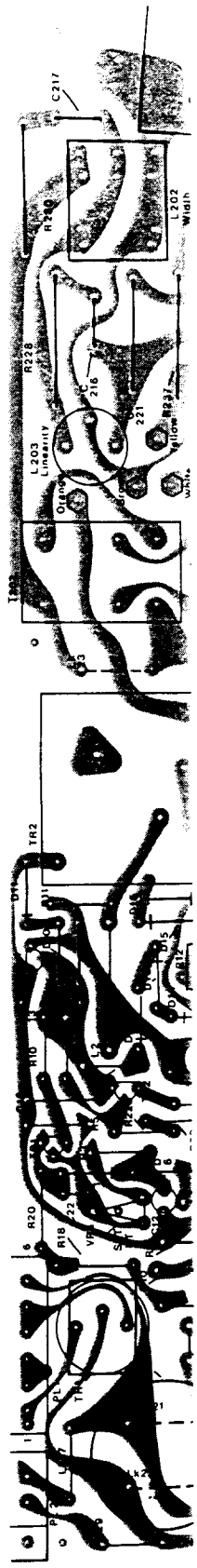

64μS
200V
20mS
50V
60V
55V
D22
D23
200V
R25
+124V
0V
PL104
C24
C25
C26
R27
C27
C28
C30
R26
C31
C32
C33
C34
D24
R137
R138
D25
LK14
D116
IC102
R140
C104
+12V
R136
TR106
C106
D117
R135
C105
D118
+12V
L902
Red
Green
Blue
C901
R904
R907
R912
R936
R918
R922
TR901
TR903
TR905
D901
D902
D903
D904
D905
D906
R911
R917
R933
TR902
TR904
TR906
R924
L925
R926
L924
R925
L926
To Chassis
Cathode Ray Tube
47K
In CRT cap
R931
VR932
R934
CRT DAG
VR903
R905
VR906
VR910
C905
VR914
R908
C904
R913
R915
C906
VR921
VR916
C907
R920
Red
D907
D908
R923
TR907
R927
TL901
C910
C911
R933
R937
R928
C913
Mauve
Black
Grey
Pink Mixed Blanking
Green
Blue
Brown
Focus
White
EHT
Yellow
R302
C307
VR321
R326
Frame Coils
Line Coils
PL201
R236
C302
D302
C304
R315
R322
LK11
LK12
R324
TR301
C223
R304
TABS
IC301
C312
R231
C218
R303
D301
R305
R308
VR307
Field Freq.
R301
R314
R316
R318
R320
C303
C305
R313
EW
VR328
R237
Heater Choke
TL202
Focus
TRIPLER
C301
Height
VR306
R310
R311
VR312
Frame Linearity
R317
LK13
C311
R325
R327
LK16
Pin 13 for 20° only *
C308
C310
R323
R206
R206 has 2 positions - only for special req. is it connected to 0V
connected when R206 is horiz.
T202
E-W Transductor
Tag
T203
LK10
LK8
C211
C212
VR220
Line phase
R221
R222
R214
L201
R208
R205
R226
R230
LK23
Link fitted when E-W correction is not required
R235
D201
TL201
+25V
C221
L202
Width
C217
R225
L204
R227
IC201
C207
R211
R213
C210
C214
T201
TR202
R233
C222
TO CRT p BAND
TO CHASSIS
C224
R217
R216
R223
C213
R224
TR201
C215
R228
C216
L203
Linearity
R232
C220
C225 *
R234
R210
R212
Line frequency
VR218
C208
R215
C205
C206
4V p-p
20mS
40V
64μS
980V pk
11.8μS
NOTES : * R18,R20 & C21 are only fitted for 110V models
* C225 is only fitted on medium & high res. models
LK2,LK9 & LK15 are not marked
* R237 is only fitted on 20° models where 20° transformer does not include integral heater choke

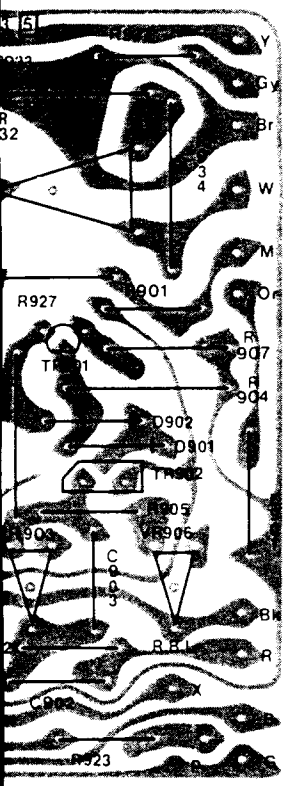
STANDARD/MEDIUM RESOLUTION TUBE BASE



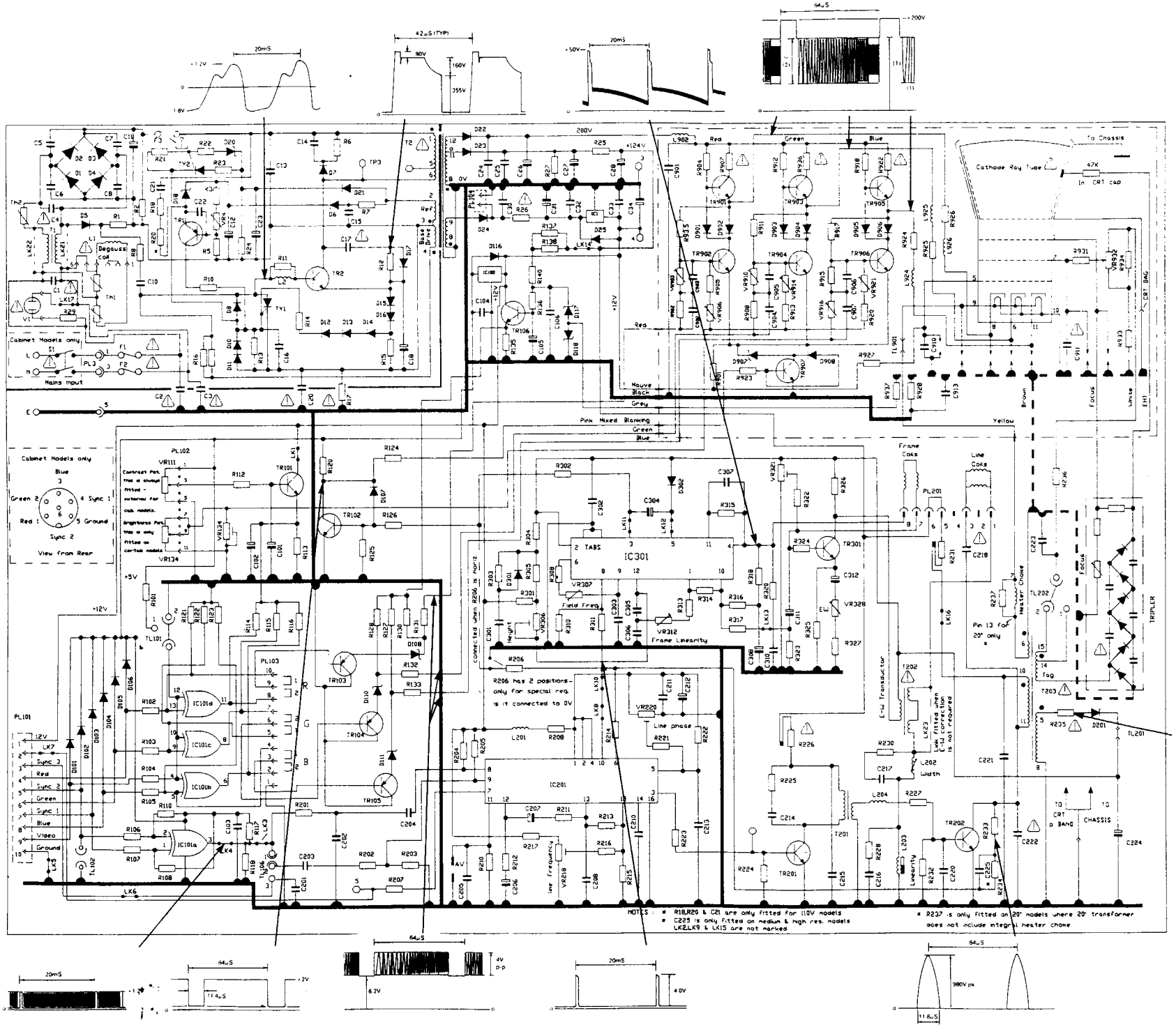


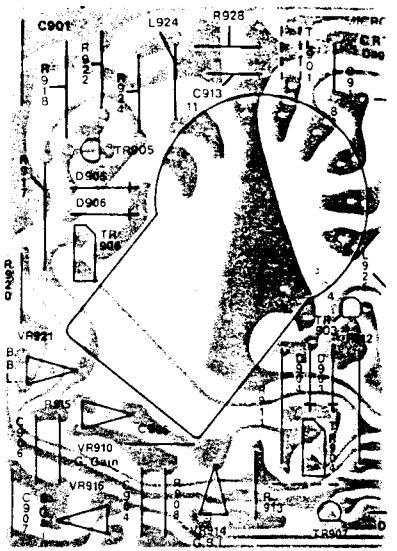


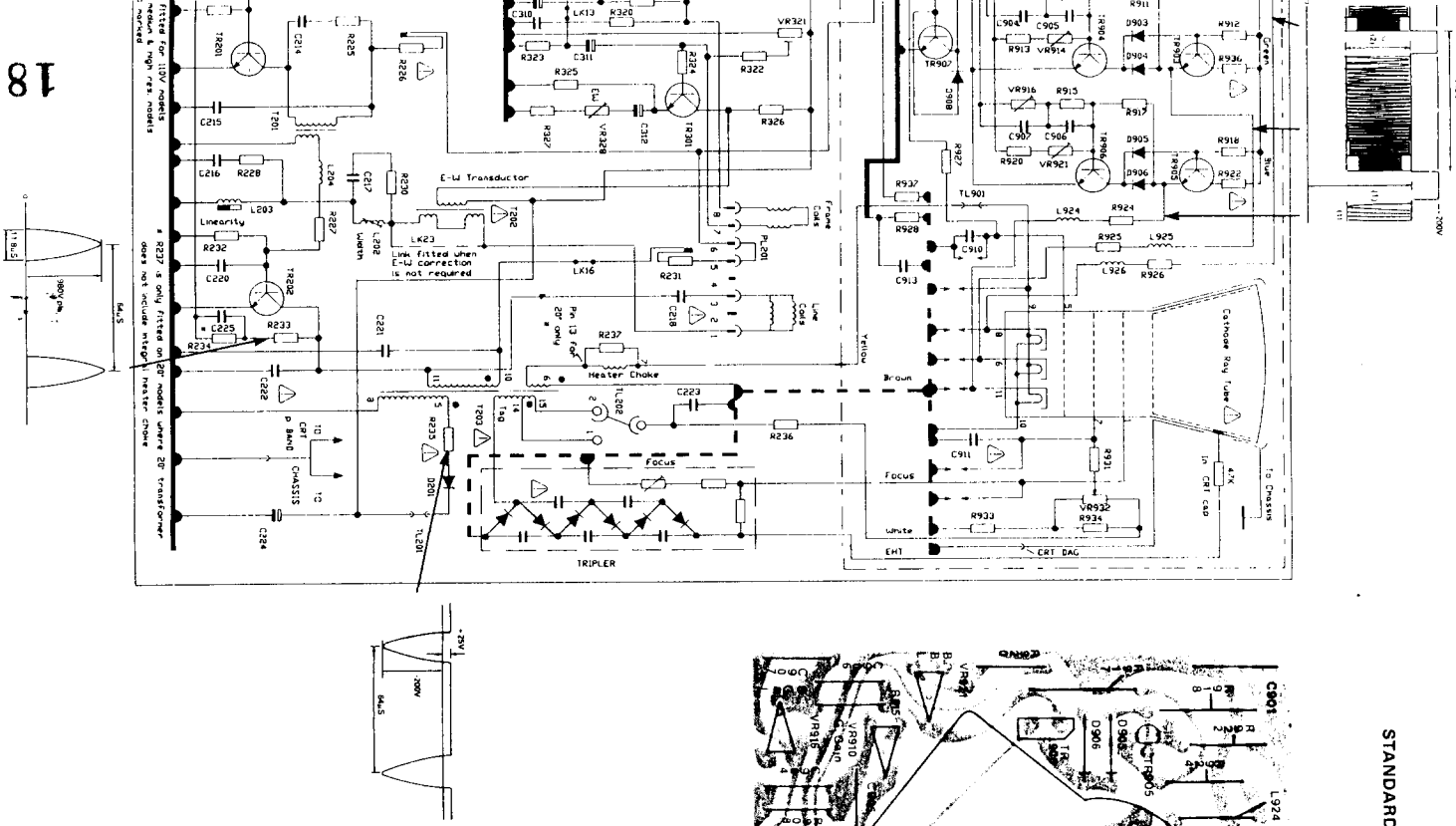


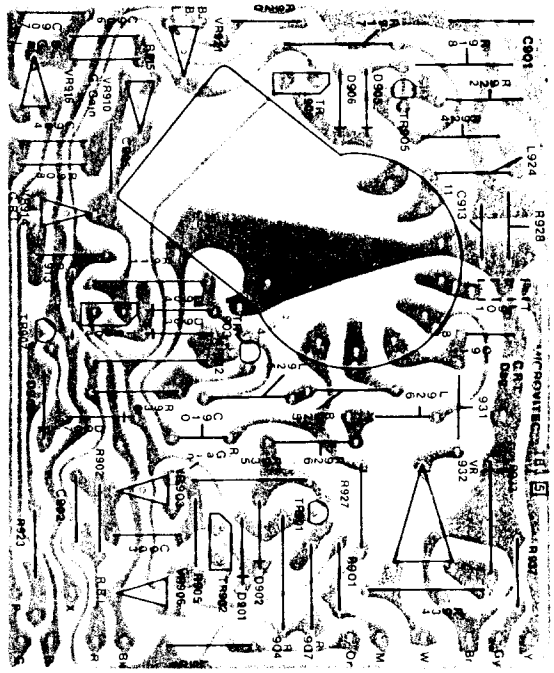


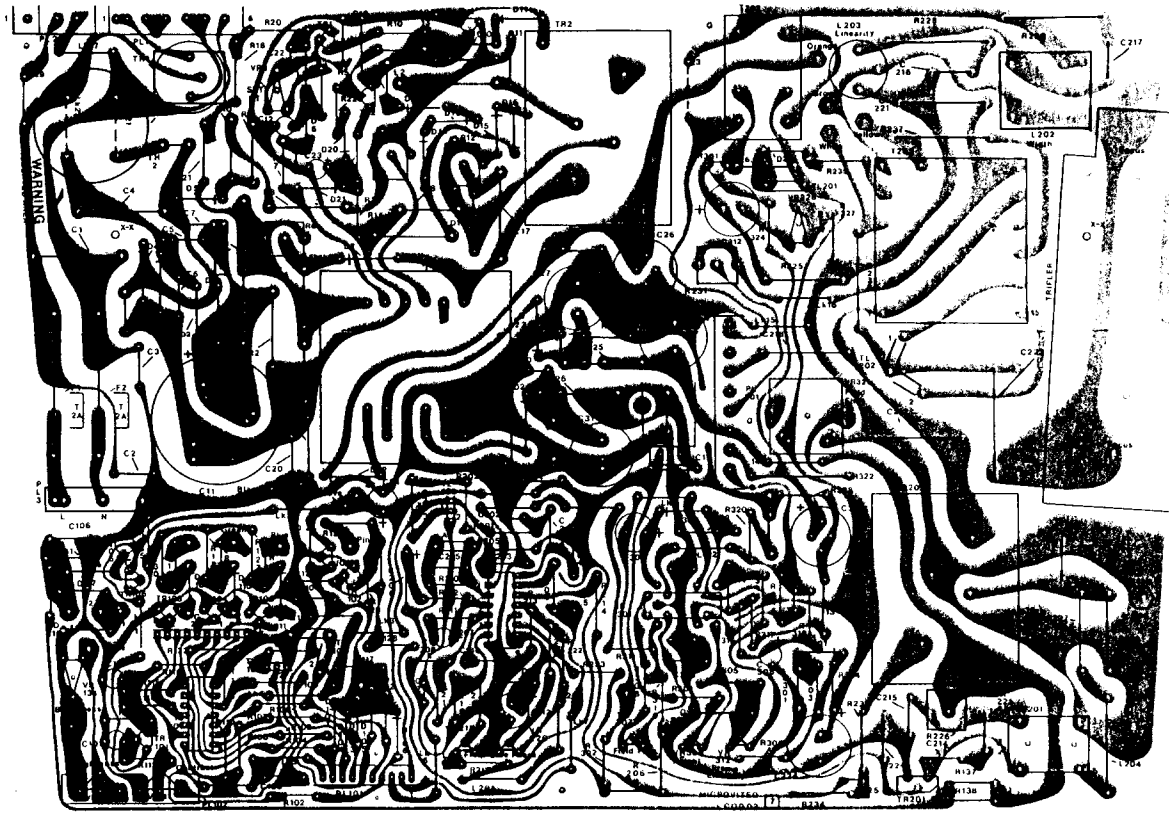
MAIN PCB LAYOUT


Cabinet Models only
Blue
Green
Red
Sync 2
Sync 1
Ground
View from Rear
Mains Input
Degauss Coil
Cathode Ray Tube
To Chassis
47K
In CRT cap
IC301
IC201
IC101a
IC101b
IC101c
IC101d
TRIPLER
Frame Coils
Line Coils
Heater Choke
Focus
Field Freq.
Height
Frame Linearity
Line phase
Width
Linearity
E-W Transductor
Low frequency
Pin 13 for 20° only
R206 has 2 positions - only for special req. is it connected to 0V
Connected when R206 is horiz
Brightness Pot. this is only fitted on certain models
Contrast Pot. this is always fitted - external for cab. models.
TABS
Red
Green
Blue
Grey
Mauve
Black
Pink
Mixed Blanking
Yellow
Brown
White
CRT BAG
Focus
EHT
TO CRT p BAND
TO CHASSIS
NOTES :- * R18,R20 & C21 are only fitted for 110V models
* C225 is only fitted on medium & high res. models
LK2,LK9 & LK15 are not marked
* R237 is only fitted on 20" models where 20" transformer does not include integral heater choke


C901
L924
R928
C913
TR905
D906
VR921
VR910
G Gain
VR916
TR907

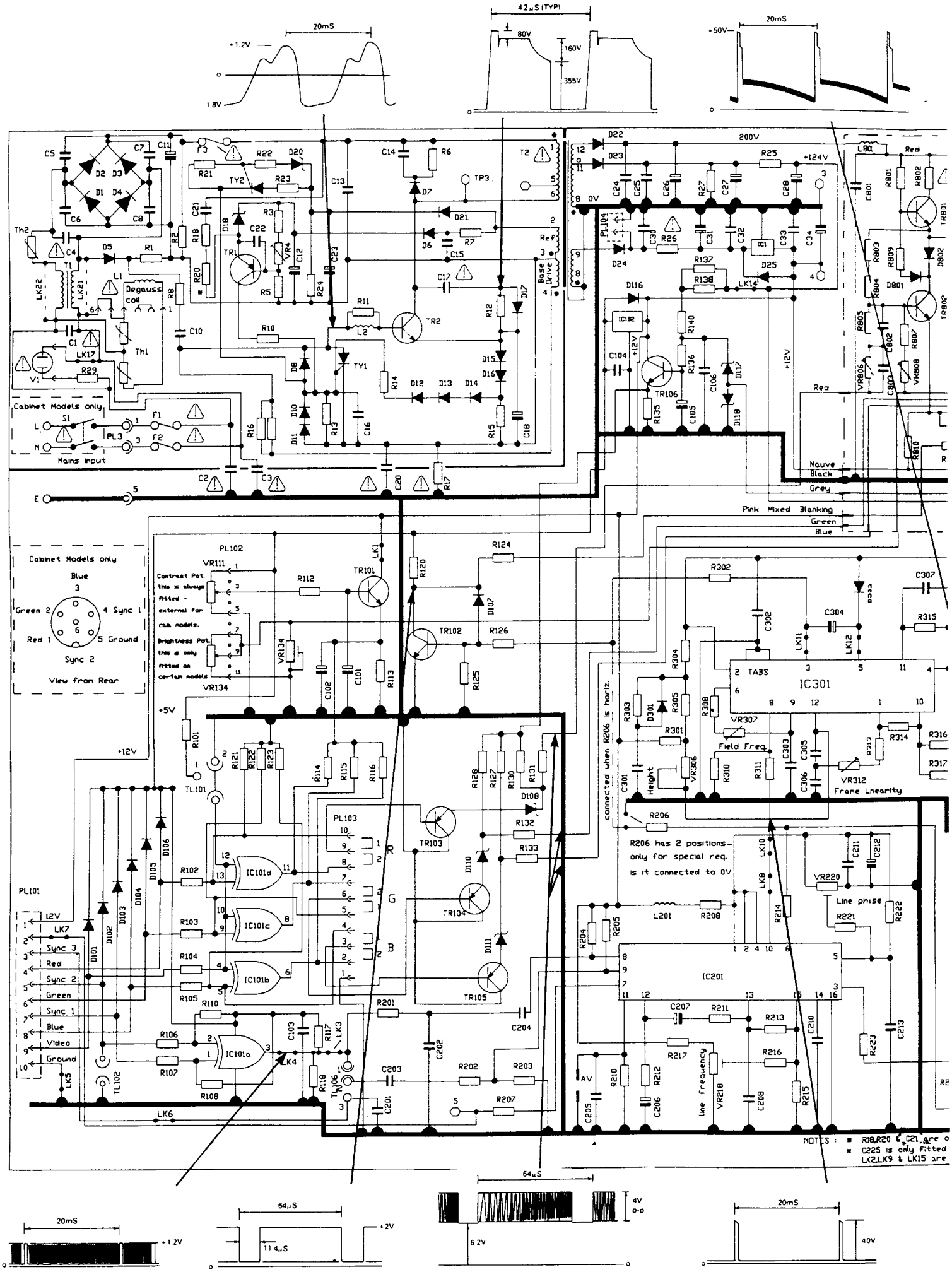


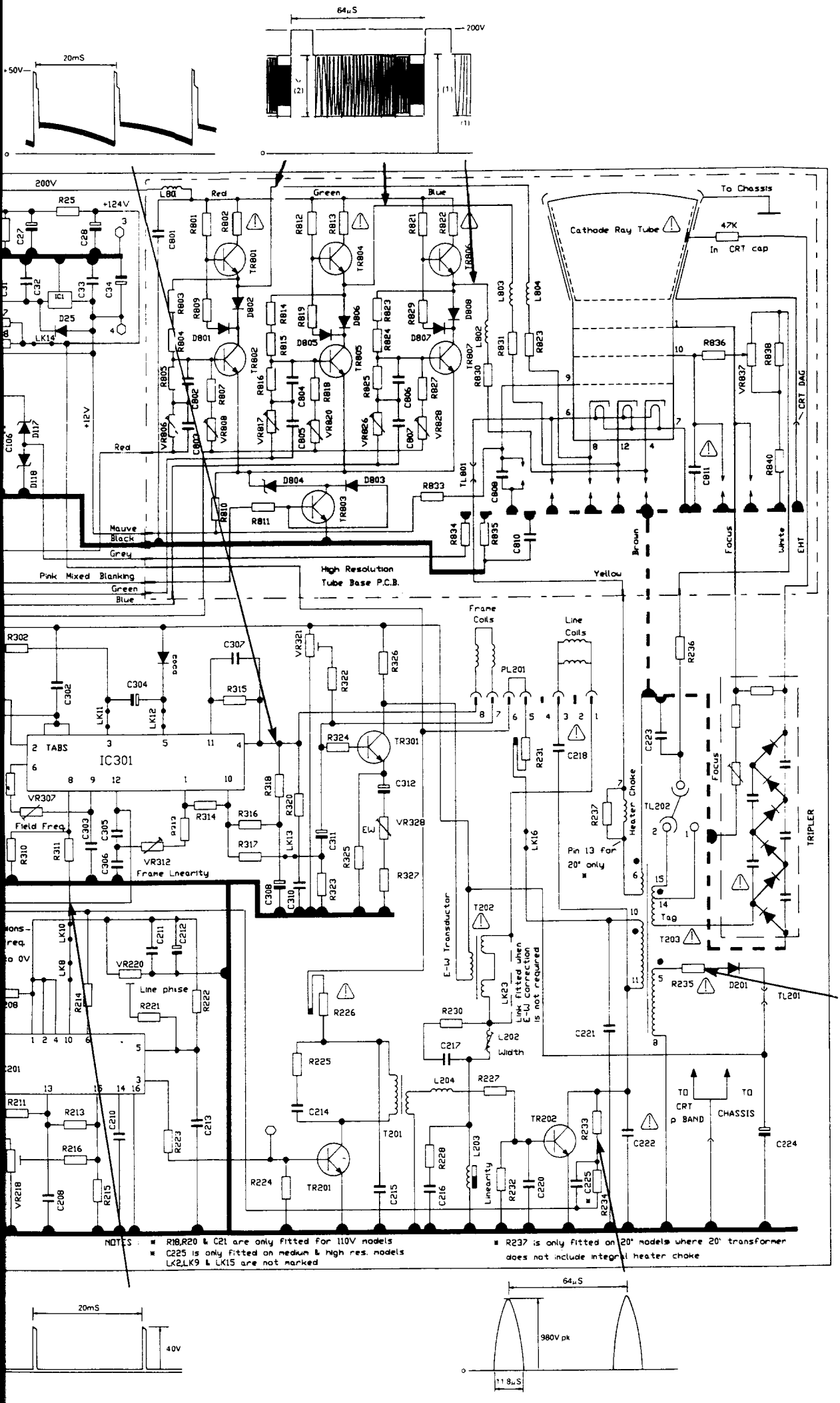




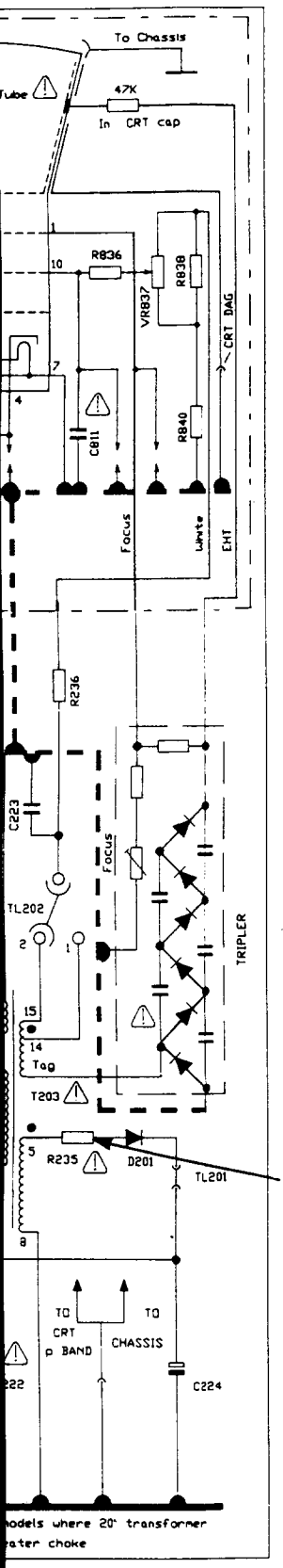
MAIN PCB LAYOUT

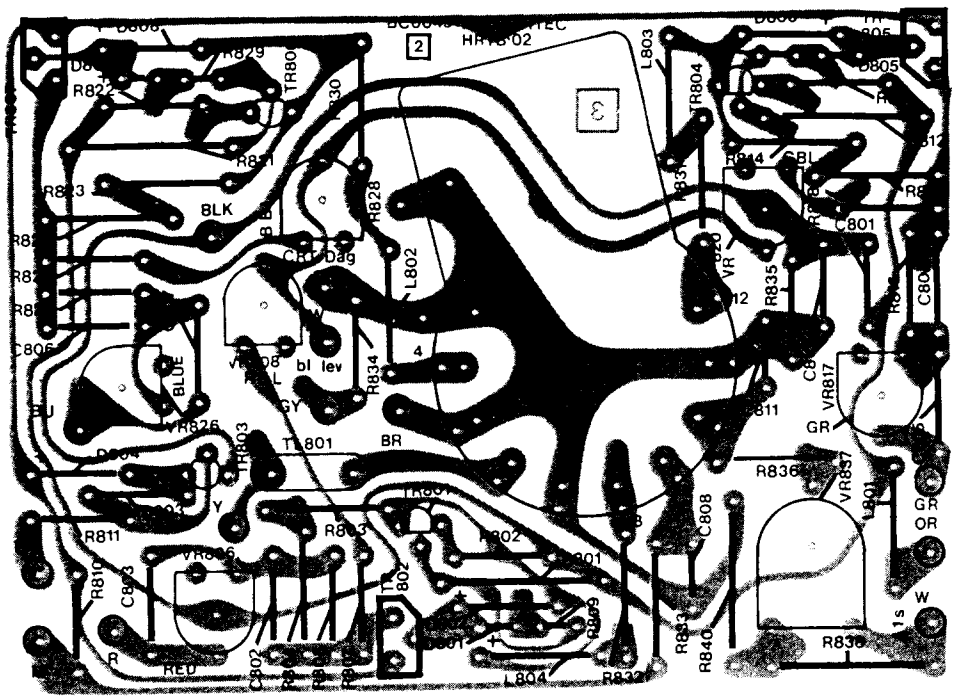
STANDARD/MEDIUM RESOLUTION TUBE BASE

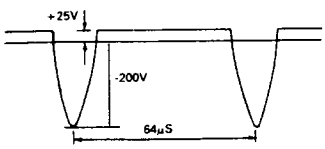

20mS
+1.2V
0
1.8V
42μS (TYP)
80V
160V
355V
20mS
+50V
0
200V
+124V
0V
+12V
Degauss coil
Mains input
Cabinet Models only
Blue
Green 2
4 Sync 1
Red 1
5 Ground
Sync 2
View from Rear
Contrast Pot. this is always fitted - external for cab. models.
Brightness Pot. this is only fitted on certain models
Mauve
Black
Grey
Pink Mixed Blanking
Green
Blue
IC301
TABS
Field Freq.
Height
VR312
Frame Linearity
R206 has 2 positions - only for special req. is it connected to 0V
Line phase
Line frequency
IC201
IC101a
IC101b
IC101c
IC101d
TR101
TR102
TR103
TR104
TR105
TR106
PL101
PL102
PL103
PL104
12V
Sync 3
Red
Sync 2
Green
Sync 1
Blue
Video
Ground
64μS
4V p-p
6.2V
114μS
40V
NOTES :

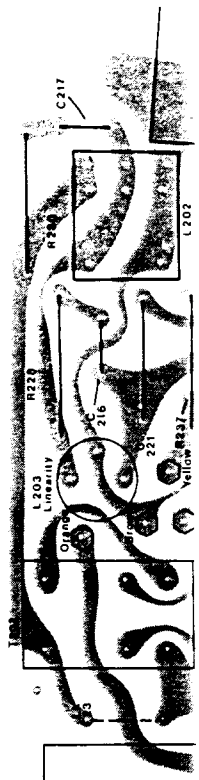

64µS
200V
20mS
+50V
200V
R25
+124V
C27
C28
C32
C33
C34
IC1
D25
LK14
+12V
D117
D118
C106
L801
Red
Green
Blue
R801
R802
R812
R813
R821
R822
TR801
TR804
TR806
R803
R809
D802
D801
R804
R814
R819
D805
D806
R823
R824
R829
D807
D808
L803
L804
TR802
TR805
TR807
R805
R816
R825
R830
R831
R823
R807
R827
C802
C804
C806
C805
C807
VR806
VR808
VR817
VR820
VR826
VR828
R836
R838
VR837
R840
C811
CRT DAG
To Chassis
Cathode Ray Tube
47K
In CRT cap
D804
D803
TR803
R810
R811
R833
TL801
C808
R834
R835
C810
Mauve
Black
Grey
Pink Mixed Blanking
Green
Blue
High Resolution
Tube Base P.C.B.
Brown
Yellow
Focus
White
EHT
Frame
Coils
Line
Coils
PL201
R302
C302
C307
C304
R315
LK11
LK12
VR321
R322
R326
R236
2 TABS
3
5
11
4
6
IC301
8
9
12
1
10
VR307
Field Freq.
R310
R311
C303
C305
C306
R314
R316
R317
VR312
Frame Linearity
R324
TR301
C312
VR328
EW
C311
R325
R327
R318
R320
LK13
C308
C310
R323
R231
C218
C223
Focus
TL202
R237
Heater Choke
Pin 13 for
20° only
LK16
TRIPLER
T202
E-W Transductor
T203
Tag
R235
D201
TL201
+25V
-200V
64µS
LK23
Link fitted when
E-W correction
is not required
R230
L202
Width
C217
C221
R226
R225
C214
L204
R227
T201
TR202
R233
C222
C224
TO
CRT
p BAND
TO
CHASSIS
R224
TR201
C215
R228
C216
L203
Linearity
R232
C220
C225
R234
LK10
LK8
C211
C212
VR220
Line phise
R214
R221
R222
R211
R213
C210
C213
R223
R216
VR218
C208
R215
NOTES :
* R18,R20 & C21 are only fitted for 110V models
* C225 is only fitted on medium & high res. models
LK2,LK9 & LK15 are not marked
* R237 is only fitted on 20° models where 20° transformer
does not include integral heater choke
20mS
40V
64µS
980V pk
11.8µS

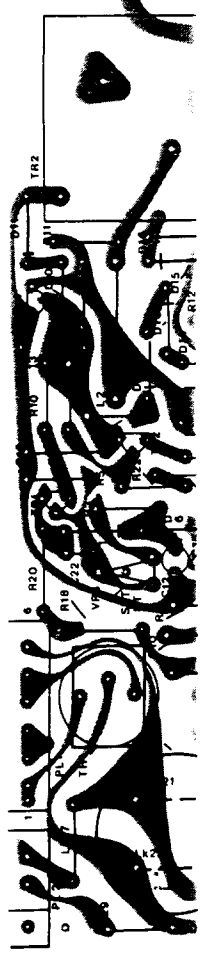
HIGH RESOLUTION TUBE BASE

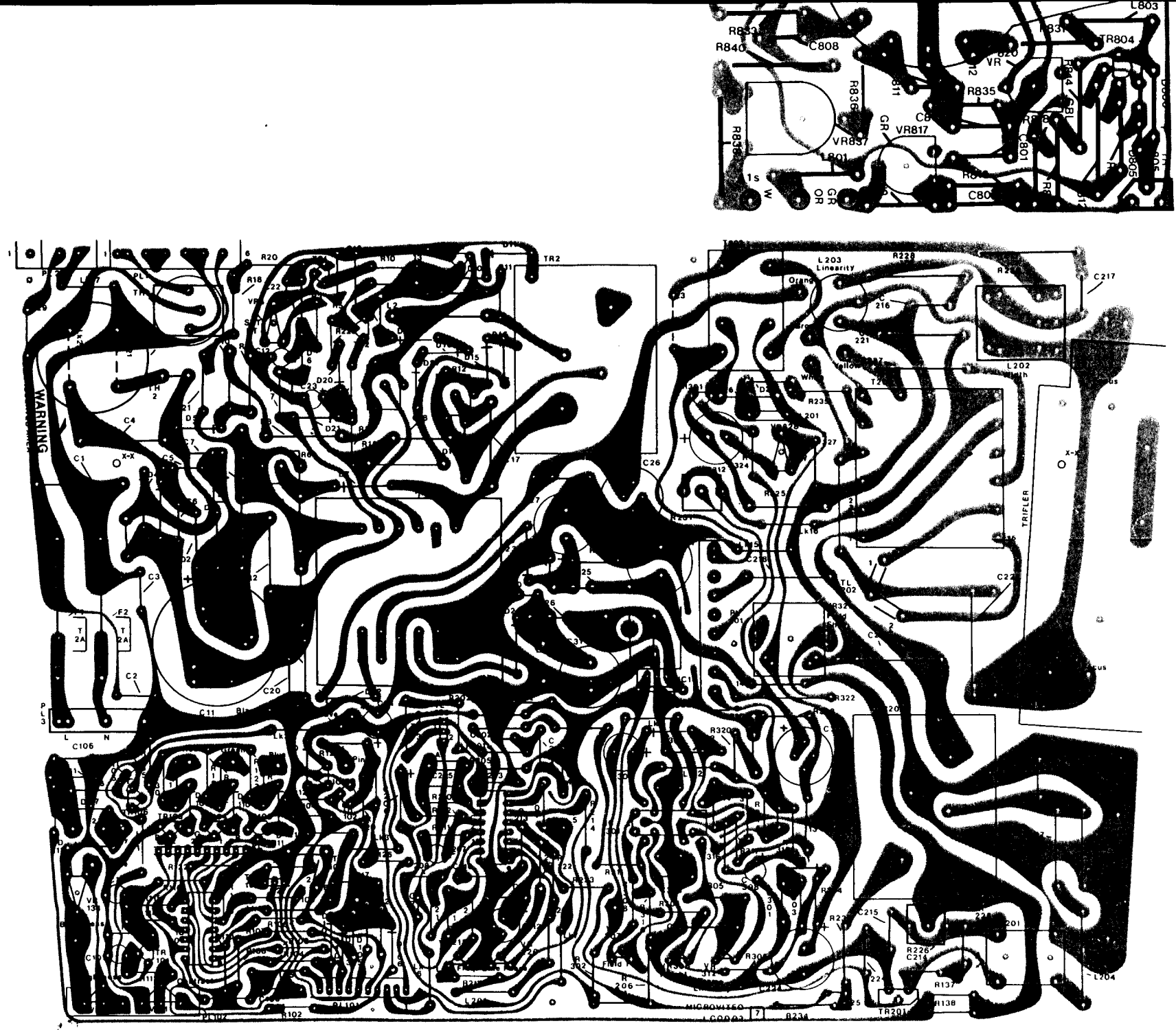




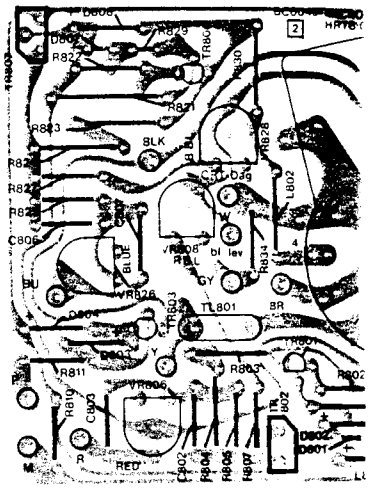


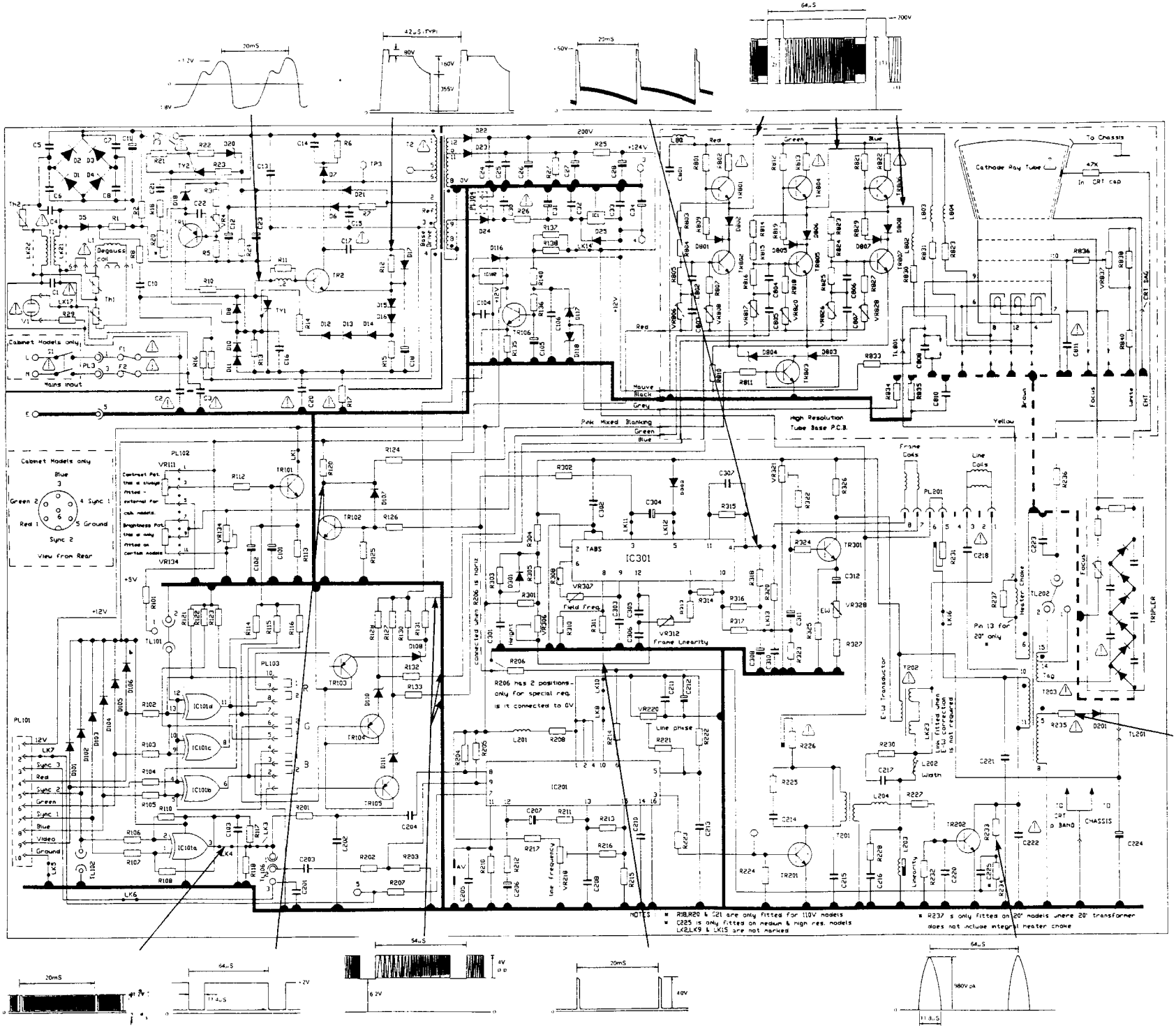


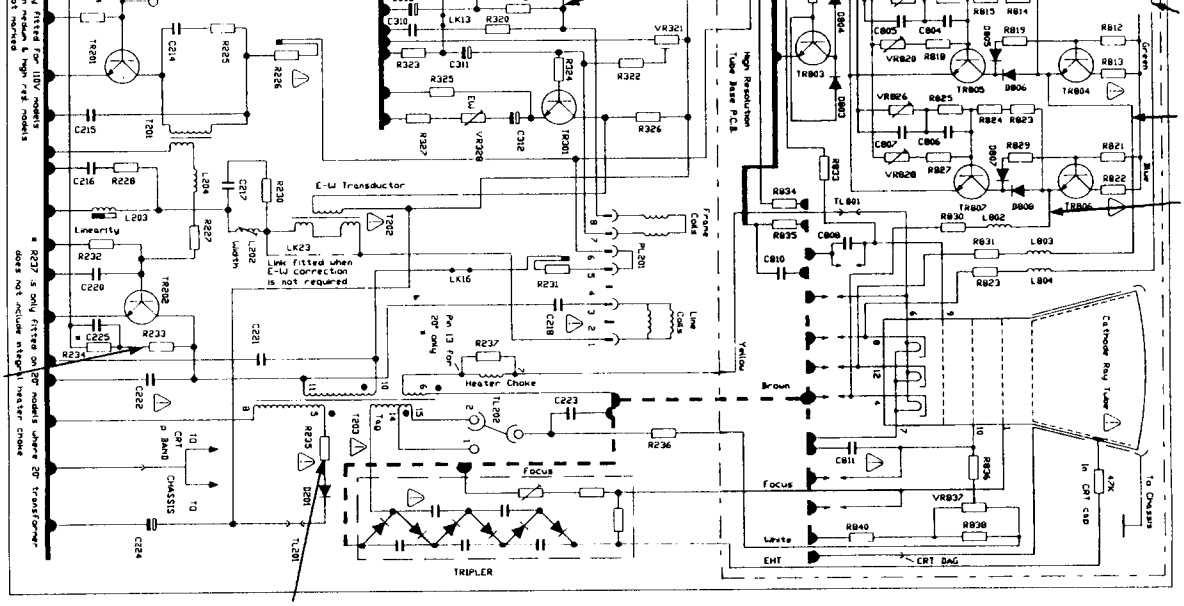


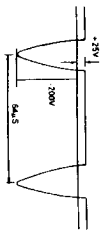


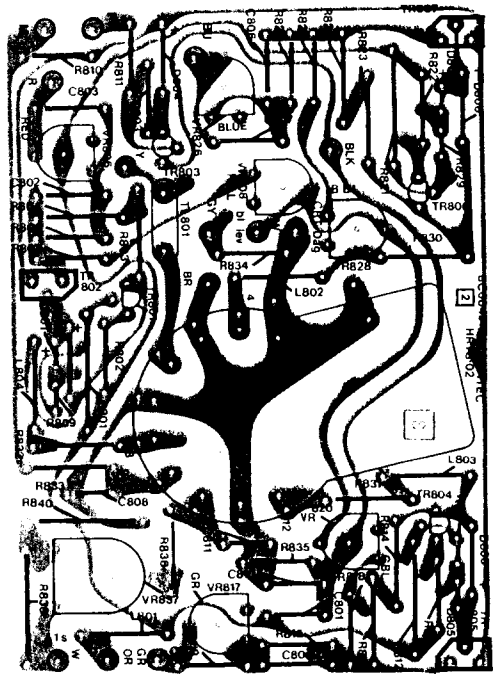
MAIN PCB LAYOUT



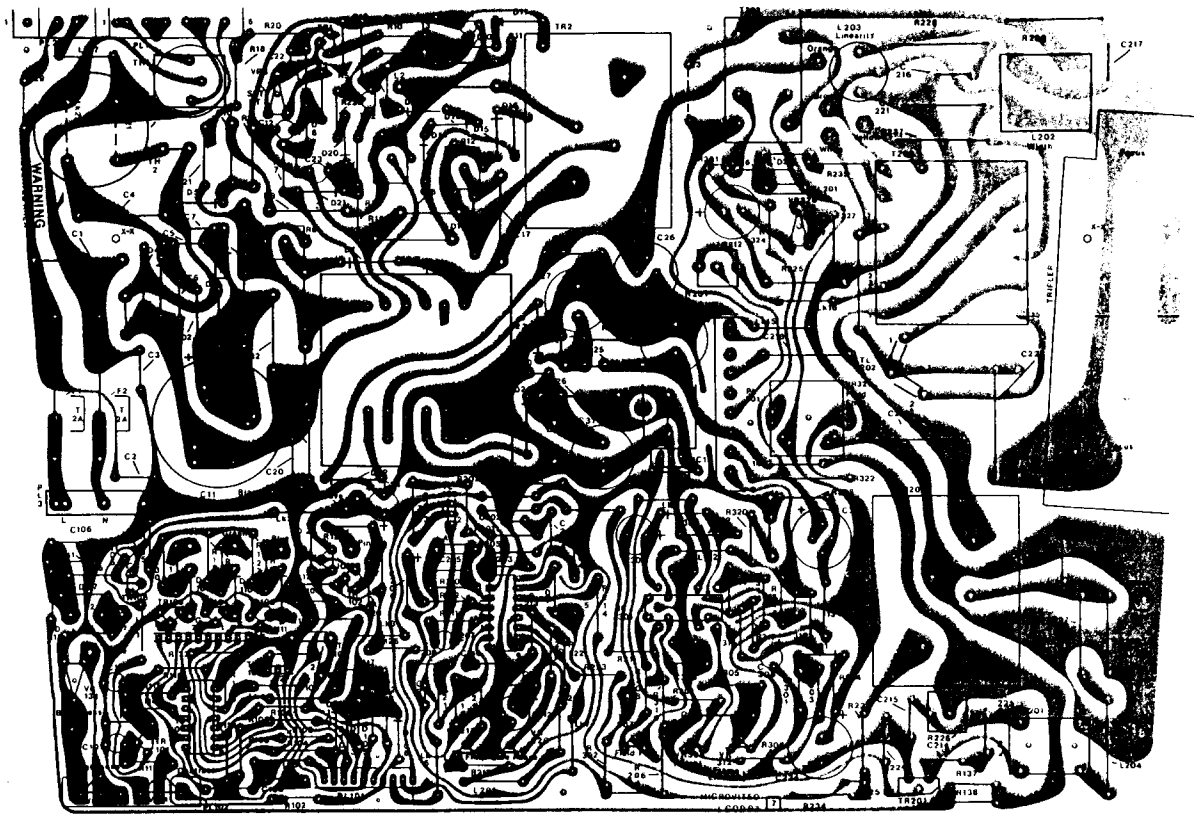

Cabinet Models only
Blue 3
Green 2
4 Sync 1
Red 1
5 Ground
Sync 2
View from Rear
Mains input
Degauss coil
Cathode Ray Tube
To Chassis
47K in CRT cap
High Resolution Tube Base P.C.B.
IC301
IC201
TRIPLER
Frame Coils
Line Coils
Focus
Heater choke
Line phase
Field freq.
Height
Frame Linearity
E-W Transducer
Width
Linearity
Pin 13 for 20" only
Line fitted when E-W correction is not required
CRT Base Panel
CHASSIS
Cabinet Models only
Contrast Pot. (not a skeleton fitted - external for cab. models)
Brightness Pot. (not a skeleton fitted on certain models)
R206 has 2 positions - only for special req. is it connected to 0V
R206 is connected when horiz
NOTES
* R18,R20 & C21 are only fitted for 110V models
* C225 is only fitted on medium & high res. models
LK2,LK9 & LK15 are not marked
* R237 is only fitted on 20" models where 20" transformer does not include integral heater choke



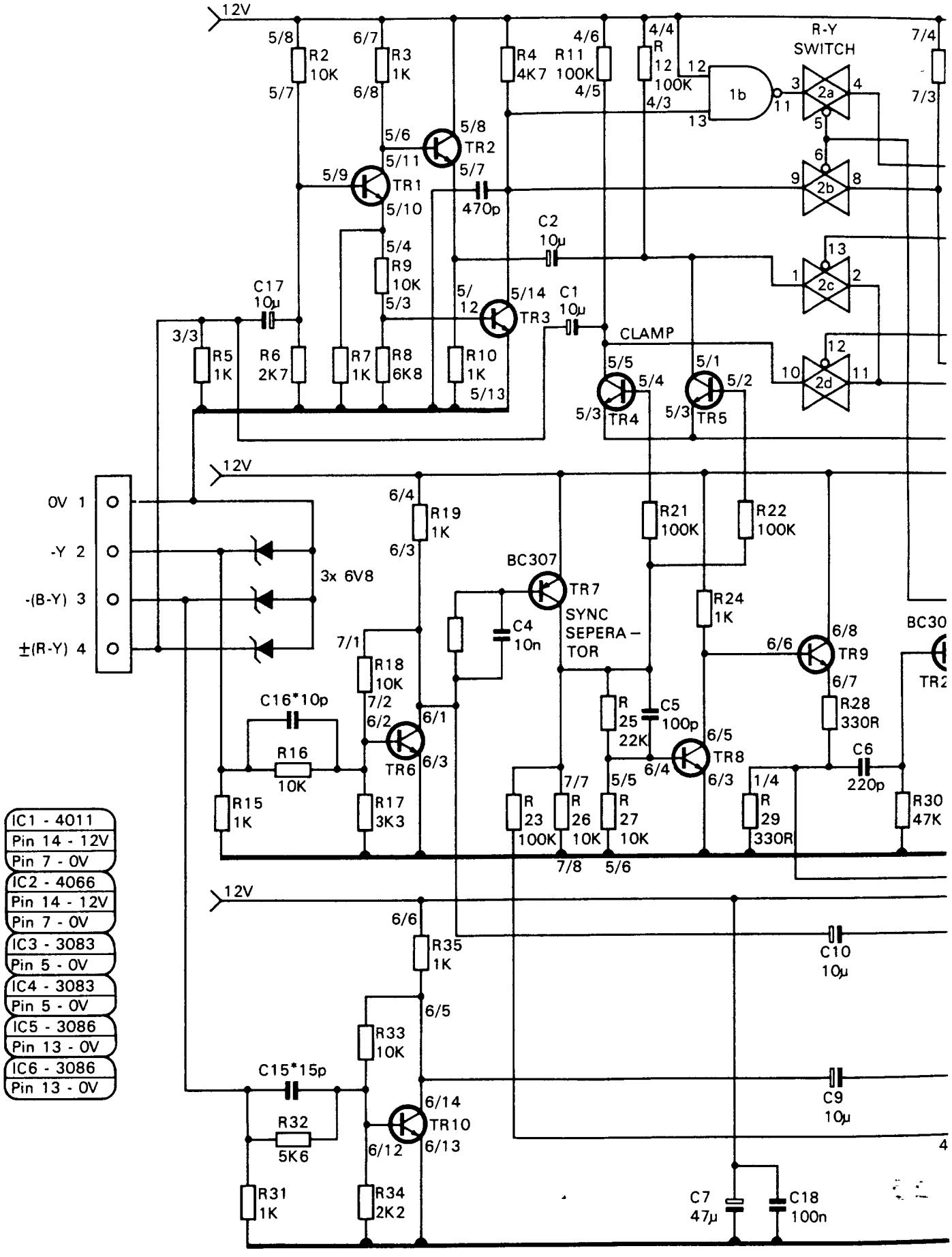




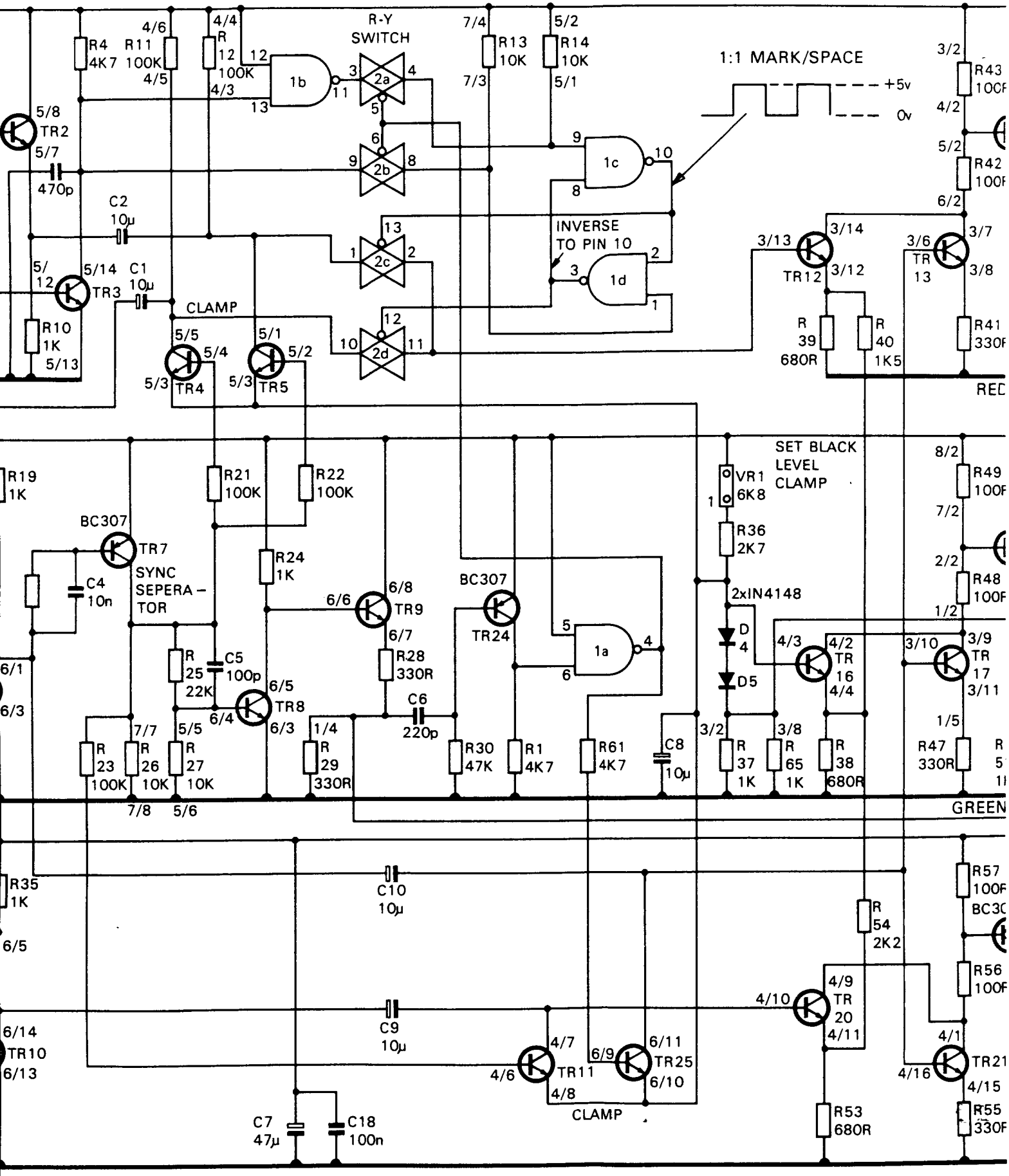
HIGH RESOLUTION TUBE BASE

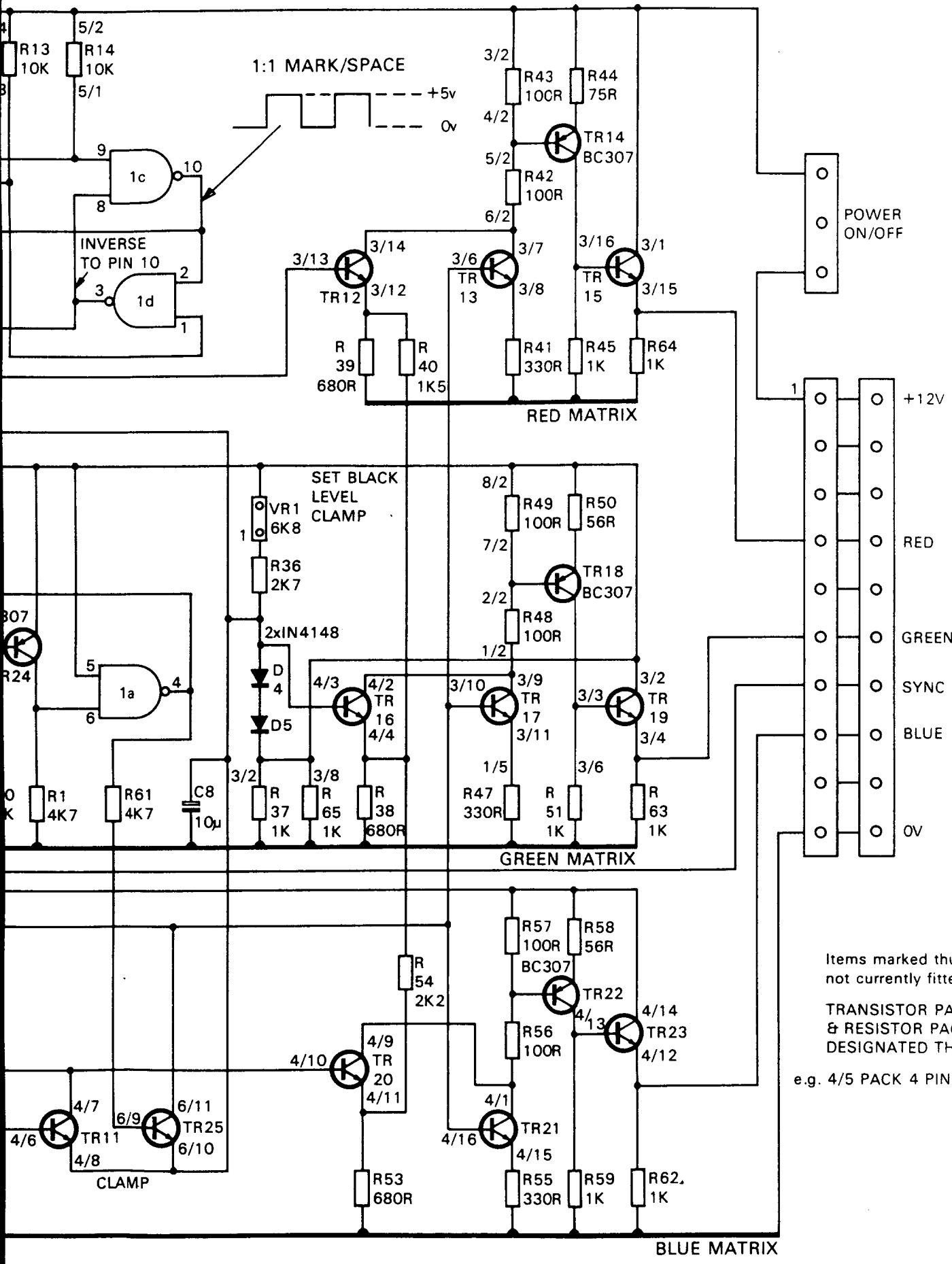


MAIN PCB LAYOUT



IC1 - 4011
Pin 14 - 12V
Pin 7 - 0V
IC2 - 4066
Pin 14 - 12V
Pin 7 - 0V
IC3 - 3083
Pin 5 - 0V
IC4 - 3083
Pin 5 - 0V
IC5 - 3086
Pin 13 - 0V
IC6 - 3086
Pin 13 - 0V


R-Y SWITCH
1:1 MARK/SPACE
+5v
0v
INVERSE TO PIN 10
SET BLACK LEVEL CLAMP
CLAMP
CLAMP
2xIN4148
BC307
TR7
SYNC SEPERA – TOR
TR2
TR3
TR4
TR5
TR8
TR9
TR24
TR10
TR11
TR25
TR12
TR13
TR16
TR17
TR20
TR21
R4 4K7
R11 100K
R10 1K
R19 1K
R21 100K
R22 100K
R24 1K
R23 100K
R25 22K
R26 10K
R27 10K
R28 330R
R29 330R
R30 47K
R1 4K7
R61 4K7
R35 1K
R13 10K
R14 10K
R36 2K7
R37 1K
R65 1K
R38 680R
R39 680R
R40 1K5
R41 330R
R42 100R
R43 100R
R47 330R
R48 100R
R49 100R
R53 680R
R54 2K2
R55 330R
R56 100R
R57 100R
VR1 6K8
C1 10µ
C2 10µ
C4 10n
C5 100p
C6 220p
C7 47µ
C8 10µ
C9 10µ
C10 10µ
C18 100n
470p
1a
1b
1c
1d
2a
2b
2c
2d
D4
D5
GREEN
RED

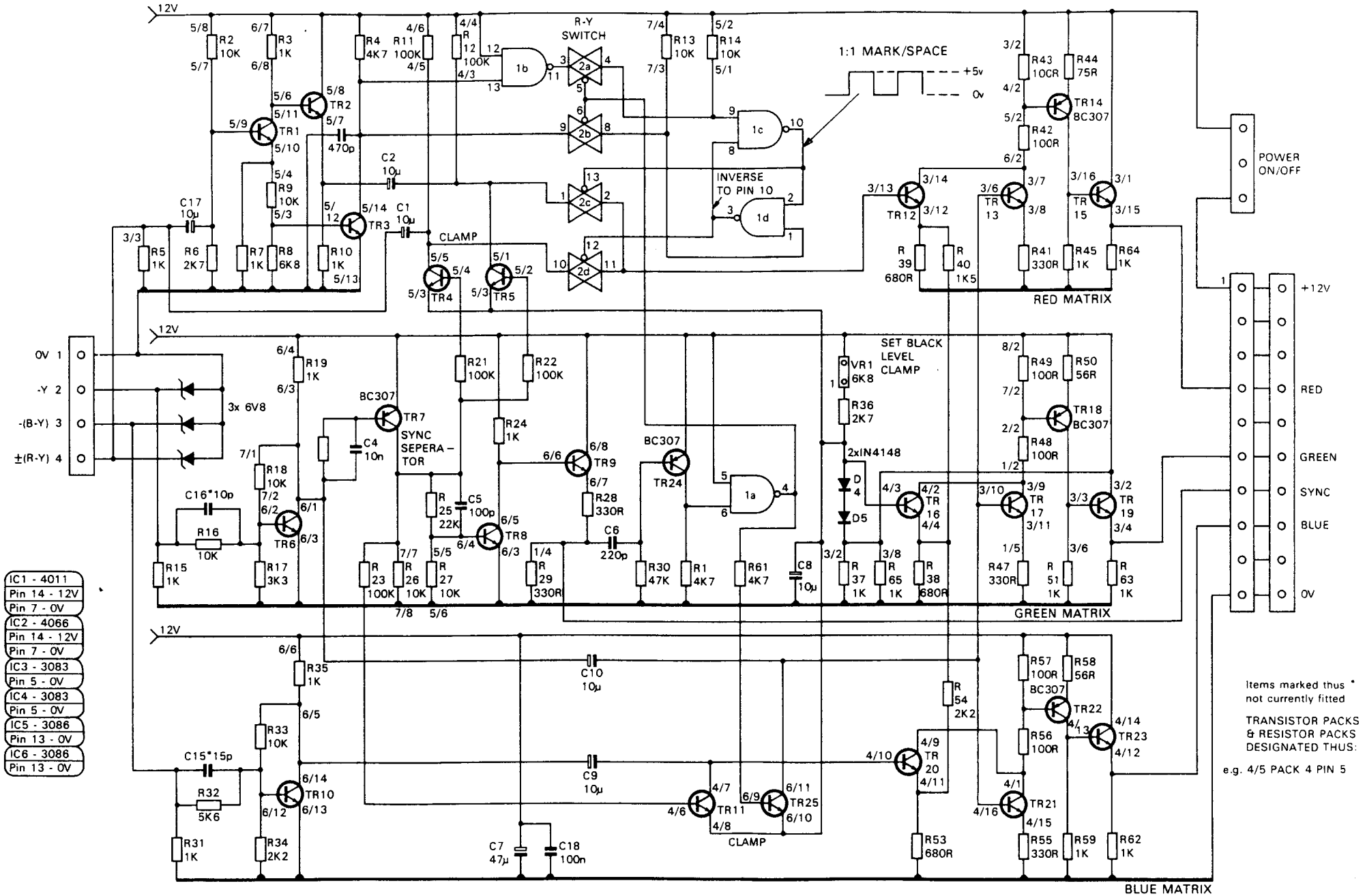


Items marked thus * not currently fitted

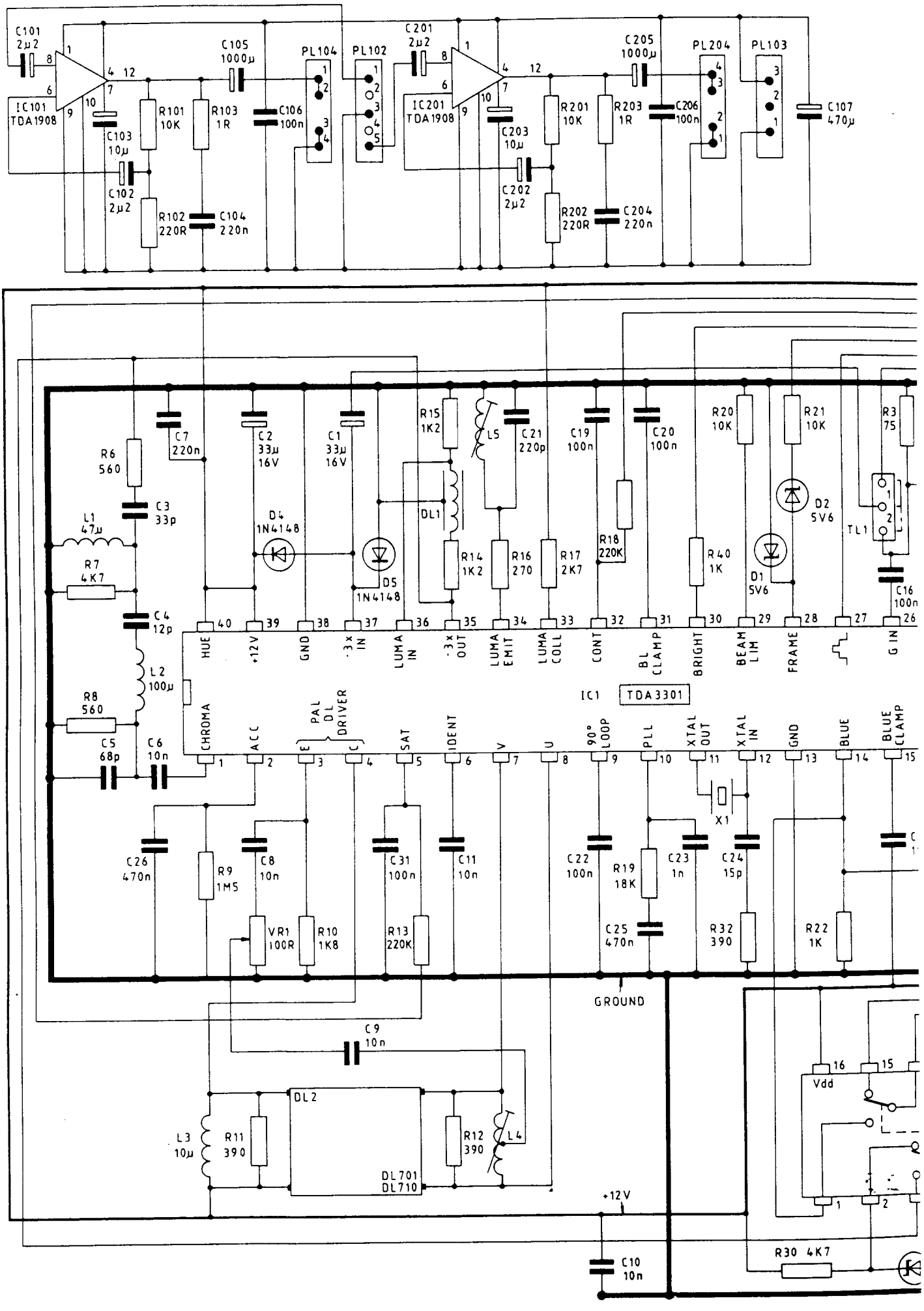
TRANSISTOR PACKS & RESISTOR PACKS DESIGNATED THUS:

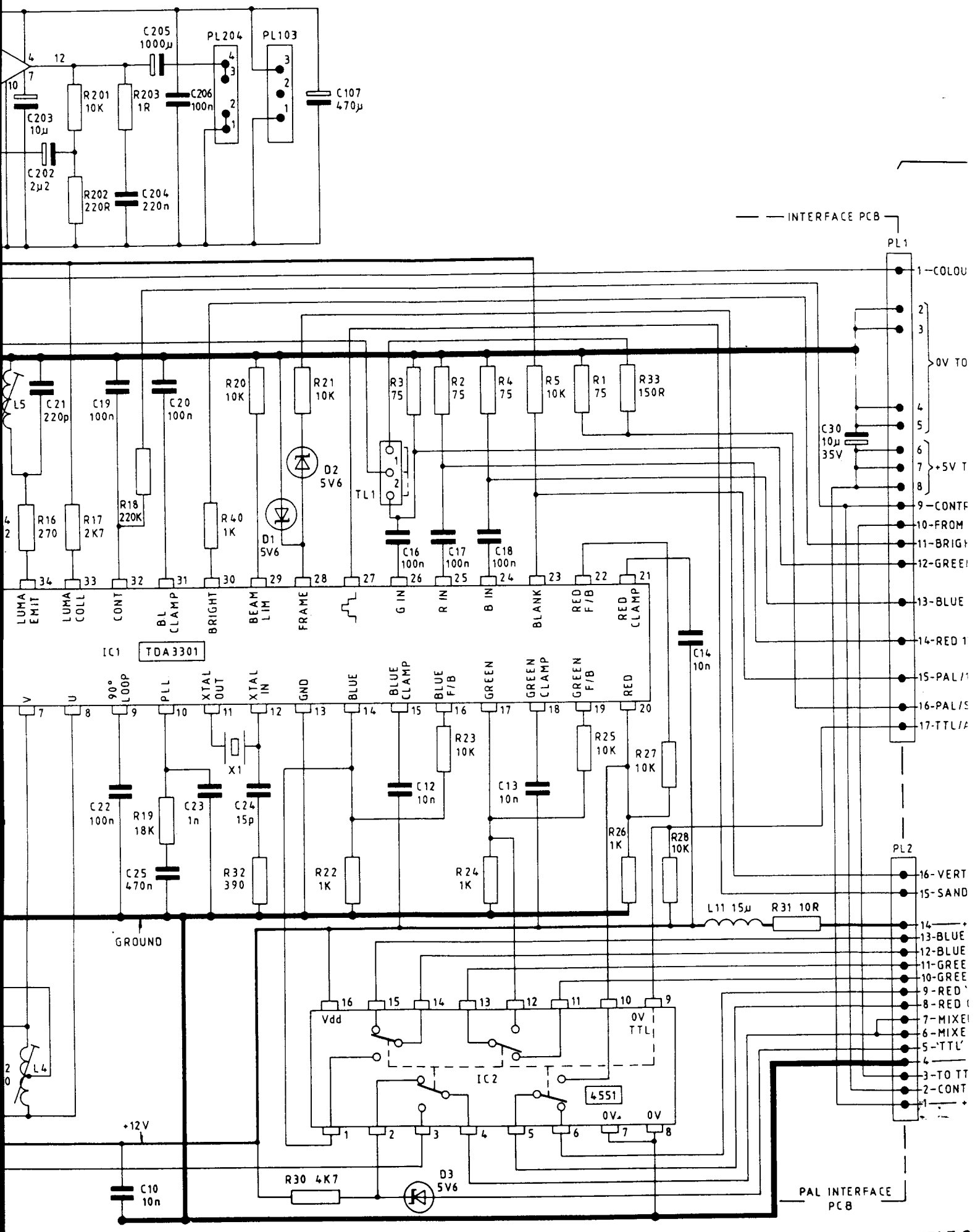
e.g. 4/5 PACK 4 PIN 5

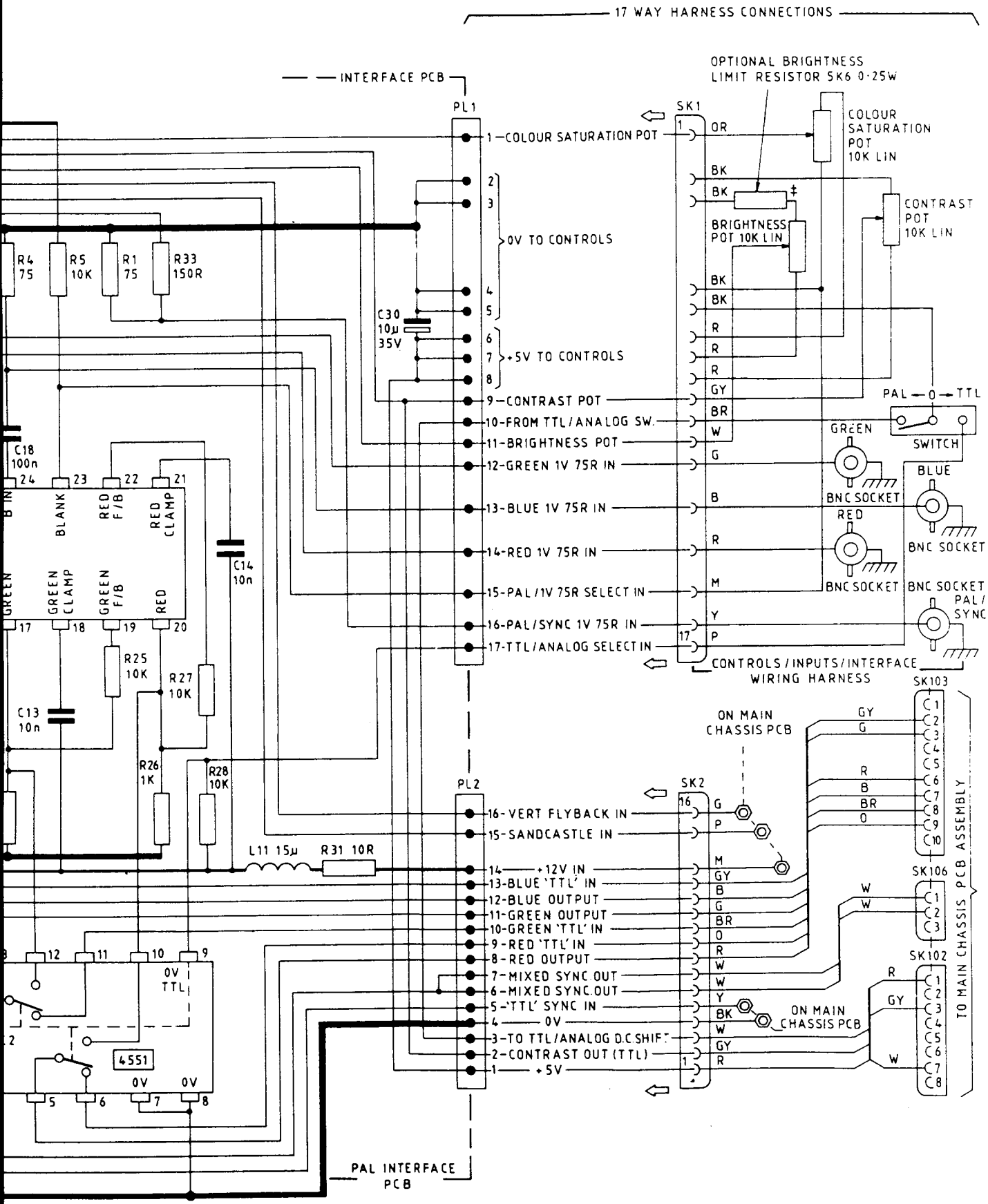
SINCLAIR ZX SPECTRUM INTERFACE



SINCLAIR ZX SPECTRUM INTERFACE


C101 2µ2
IC101 TDA1908
C103 10µ
C102 2µ2
R101 10K
R102 220R
R103 1R
C104 220n
C105 1000µ
C106 100n
PL104
PL102
C201 2µ2
IC201 TDA1908
C203 10µ
C202 2µ2
R201 10K
R202 220R
R203 1R
C204 220n
C205 1000µ
C206 100n
PL204
PL103
C107 470µ
C7 220n
C2 33µ 16V
C1 33µ 16V
R15 1K2
L5
C21 220p
C19 100n
C20 100n
R20 10K
R21 10K
R3 75
R6 560
C3 33p
L1 47µ
D4 1N4148
D5 1N4148
DL1
R14 1K2
R16 270
R17 2K7
R18 220K
R40 1K
D1 5V6
D2 5V6
TL1
C16 100n
R7 4K7
C4 12p
L2 100µ
R8 560
C5 68p
C6 10n
HUE
+12V
GND
-3x IN
LUMA IN
-3x OUT
LUMA EMIT
LUMA COLL
CONT
BL CLAMP
BRIGHT
BEAM LIM
FRAME
G IN
IC1 TDA3301
CHROMA
ACC
PAL DL DRIVER
SAT
IDENT
V
U
90° LOOP
PLL
XTAL OUT
XTAL IN
GND
BLUE
BLUE CLAMP
X1
C26 470n
R9 1M5
C8 10n
VR1 100R
R10 1K8
C31 100n
R13 220K
C11 10n
C22 100n
R19 18K
C25 470n
C23 1n
C24 15p
R32 390
R22 1K
GROUND
C9 10n
DL2
L3 10µ
R11 390
R12 390
L4
DL701 DL710
Vdd
+12V
C10 10n
R30 4K7


C205 1000µ
PL204
PL103
C107 470µ
R201 10K
R203 1R
C206 100n
C203 10µ
C202 2µ2
R202 220R
C204 220n
INTERFACE PCB
PL1
1-COLOU
2
3
0V TO
4
5
C30 10µ 35V
6
7
+5V T
8
9-CONTR
10-FROM
11-BRIGH
12-GREE
13-BLUE
14-RED 1
15-PAL/
16-PAL/S
17-TTL/A
L5
C21 220p
C19 100n
C20 100n
R20 10K
R21 10K
R3 75
R2 75
R4 75
R5 10K
R1 75
R33 150R
D2 5V6
TL1
R18 220K
R16 270
R17 2K7
R40 1K
D1 5V6
C16 100n
C17 100n
C18 100n
C14 10n
LUMA EMIT
LUMA COLL
CONT
BL CLAMP
BRIGHT
BEAM LIM
FRAME
G IN
R IN
B IN
BLANK
RED F/B
RED CLAMP
IC1 TDA3301
V
U
90° LOOP
PLL
XTAL OUT
XTAL IN
GND
BLUE
BLUE CLAMP
BLUE F/B
GREEN
GREEN CLAMP
GREEN F/B
RED
X1
R23 10K
R25 10K
R27 10K
C22 100n
R19 18K
C23 1n
C24 15p
C25 470n
R32 390
C12 10n
C13 10n
R22 1K
R24 1K
R26 1K
R28 10K
PL2
16-VERT
15-SAND
L11 15µ
R31 10R
14
13-BLUE
12-BLUE
11-GREE
10-GREE
9-RED
8-RED
7-MIXE
6-MIXE
5-TTL
4
3-TO TT
2-CONT
1
GROUND
L4
+12V
C10 10n
R30 4K7
D3 5V6
Vdd
0V TTL
IC2
4551
0V
0V
PAL INTERFACE PCB



TRIPLE STANDARD – PAL INTERFACE CIRCUIT DIAGRAM